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AUTHOR Spielberger, C.D.; And Others
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ABSTRACT

This series of papers on stress and anxiety is part of a larger project concerned with a critical appraisal of research needs in the areas of personality, emotion, and motivation. A group of behavioral scientists contributed their expertise in identifying critical variables, concepts, and processes relating to stress and anxiety. Rather than attempting an exhaustive review of the relevant literature, each author reviews articles in his area of expertise and notes those theoretical and empirical contributions he considers especially important. Each author specifies the knowledge needed to clarify present information and/or fill gaps in existing knowledge, and describes the theoretical and methodological problems related to these research needs. The papers presented in this series are: (1) Stress and Anxiety: An Overview; (2) Stress Research; (3) Conceptual Meaning and Measurement of Anxiety; (4) State and Trait Anxiety; (5) Physiological Aspects of Anxiety; (6) Anxiety and Learning; (7) Anxiety in Children; and (8) Neurotic Anxiety. (Author/SJL)

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RECENT RESEARCH ON STRESS AND ANXIETY
A SPECIAL REPORT OF THE USOE-SPONSORED GRANT STUDY, CRITICAL APPRAISAL OF RESEARCH IN THE PERSONALITY-EMOTIONS-MOTIVATION DOMAIN

Prepared by Task Group A300 -- Stress and Anxiety
C. D. Spielberger, Chairman, James R. Averill,
Paul McReynolds, Marvin Zuckerman, William F. Hodges
Larry R. Goulet, Beeman N. Phillips and Barclay Martin

Under the Editorship of S. B. Sells and R. G. Demaree
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TEXAS CHRISTIAN UNIVERSITY
INSTITUTE OF BEHAVIORAL RESEARCH

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Task Group Members

C. D. Spielberger, Chairman, University of South Florida

James R. Averill, University of Massachusetts

Paul McReynolds, University of Nevada

Marvin Zuckerman, University of Delaware

William F. Hodges, University of Colorado

Larry R. Goulet, University of Illinois

Beeman N. Phillips, University of Texas

Barclay Martin, University of North Carolina

FOREWORD

The task group report presented in the following pages is one of a series prepared by eminent psychologists who have served as consultants in the U. S. Office of Education sponsored grant study to conduct a Critical Appraisal of the Personality-Emotions-Motivation Domain. The study was planned with the advice of an advisory committee including Professors Raymond B. Cattell and J. McV. Hunt (University of Illinois), Donald W. MacKinnon (University of California, Berkeley), Warren T. Norman (University of Michigan), and Dr. Robert H. Beezer (USOE) and follows a topical outline included as an appendix to the present report. In order to achieve the goal of identifying important problems and areas for new research and methodological issues related to them, an approach was followed in which leading investigators in specialized areas were enlisted as members of task groups and asked to reflect on their current knowledge of ongoing research and to identify the research needs in their respective areas. The general plan is to publish these reports as a collection with integration contributed by the editors. It is hoped that these reports will prove to be valuable to research scientists and administrators.

S. B. Sells, Ph.D.
Robert G. Demaree, Ph.D.
Responsible Investigators

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Appendix: Outline for PEM Study Adopted for Planning Purposes

I. Stress and Anxiety: An Overview

Charles D. Spielberger
University of South Florida

This series of papers on stress and anxiety is part of a larger project concerned with a critical appraisal of research needs in the areas of personality, emotion, and motivation (PEM). The PEM project is supported by a grant from the U. S. Office of Education to Professor S. B. Sells, who is serving as Principal Investigator. The goals of the PEM project are to identify critical variables, concepts and processes within the PEM fields, and to describe specific theoretical and methodological problems related to the research needs in these areas.

The writer was asked by Professor Sells to undertake a critical appraisal of research on stress and anxiety. To assist him in this task, a small group of behavioral scientists who were actively working within these fields were invited to contribute their special expertise. Rather than attempting an exhaustive review of the relevant literature, each author was requested to identify important review articles in his area and to note those theoretical and empirical contributions that he considered to be especially important. He was also asked to specify the new knowledge that was needed to clarify present information and/or to fill gaps in existing knowledge.

The responsibility for determining the general outline of this appraisal of research on stress and anxiety rests with the writer. Each participant in this review was selected on the basis of his special expertise in the assigned topic and encouraged to pursue his assignment in whatever manner that seemed most appropriate. Thus

the authors of the papers which follow were given complete freedom for determining the content and approach to their own segment of the literature. It was recognized at the outset that there was a strong possibility of overlap in the various subareas. Indeed, it was considered a matter of some interest to note these areas of overlap as topics that should be the subject of more intensive inquiry.

In this overview, I will endeavor to identify important contributions to theory and research on stress and anxiety and to note some of the terminological, methodological, and theoretical issues that pertain to these fields as a whole.

Contributions to Theory and Research on Stress and Anxiety

The stresses encountered in a modern industrial society place many demands on the human condition, and significant advances in psychological theory, research, and practice are needed to help man cope with these stresses. Anxiety is perhaps the most common response to stress and appears to mediate the effects of stress on behavior. Over the past two decades, behavioral and medical scientists have given increasing attention to research on stress and anxiety which is reflected in the fact that since 1950 more than 5,000 articles and books have been published on these topics (Spielberger, 1966; 1972a).

The publication in 1950 of three important books -- May's The Meaning of Anxiety, Mowrer's Learning Theory and Personality Dynamics, and Dollard and Miller's Personality and Psychotherapy -- served to stimulate experimental work on stress and anxiety by

providing clear statements of relevant theory and research in terminology familiar to behavioral scientists. A collection of papers presented in a symposium sponsored by the American Psychopathological Association was also published that same year in a volume entitled Anxiety (Hoch & Zubin, 1950). Interest in research on stress and anxiety at mid-century was further stimulated by the development of psychometric instruments for the assessment of anxiety (Mandler & Sarason, 1952; Sarason & Mandler, 1952; Taylor, 1951, 1953).

Important book-length contributions that have had significant impact on stress and anxiety research include: Anxiety and Stress (Basowitz, Persky, Korchin, & Grinker, 1955); The Dynamics of Anxiety and Hysteria (Eysenck, 1957); Psychological Stress (Janis, 1958); Anxiety in Elementary School Children (Sarason, Davison, Lighthall, Waite, & Ruebush, 1960); The Meaning and Measurement of Neuroticism and Anxiety (Cattell & Scheier, 1961); Anxiety and Behavior (Spielberger, 1966); Psychological Stress and the Coping Process (Lazarus, 1966); Psychological Stress (Appley & Trumbull, 1967); Psychic Trauma (Furst, 1967); The Psychology of Anxiety (Levitt, 1967); Groups Under Stress (Radloff & Helmreich, 1968); Fear of Failure (Birney, Burdick, & Teevan, 1969); Explorations in the Psychology of Stress and Anxiety (Rourke, 1969); Social and Psychological Factors in Stress (McGrath, 1970); Decision and Stress (Broadbent, 1971); Theories of Anxiety (Fischer, 1970); Stress and Frustration (Janis, 1971); The Psychology of Fear and Stress (Gray, 1971); and Anxiety: Current Trends in Theory and Research (Spielberger, 1972).

The past five years have also witnessed increased interest in stress and anxiety in children (Brody & Axelrad, 1970; Wolff, 1969) and in the effects of anxiety on education (Kurzweil, 1968), academic achievement (Gaudry & Spielberger, 1971), and executive effectiveness (Schoonmaker, 1969). Five recent books on neurosis and clinical anxiety should also be noted (Branch, 1968; Lader & Marks, 1971; Marks, 1969; Martin, 1971; Rycroft, 1968).

Stress, Threat and Anxiety

One major source of ambiguity and confusion in research on stress and anxiety stems from the fact that these terms are used interchangeably by many investigators (Spielberger, 1971). This practice tends to obscure a fundamental distinction between the stimuli that evoke anxiety reactions and the properties of anxiety as an emotional state. Lazarus (1966) has noted, for example, that the term stress has at least four different meanings in psychological research. It has been used to refer to: (1) the dangerous stimulus conditions (stressors) that produce emotional reactions; (2) the cognitive, behavioral, and physiological changes (stress reactions) that are produced by stressful stimuli; (3) an intervening variable that mediates between stressful stimuli and emotional responses; and (4) a collective term that describes a broad area of study. Thus, failure to distinguish between the concepts of stress and anxiety tends to confound the objective characteristics of a danger situation with the subjective reactions to this situation.

While terminological conventions cannot be arbitrarily legislated, agreement on the definition of key concepts will represent a meaningful step in the advancement of research on stress and anxiety as an area of scientific inquiry. An adequate theory of stress and anxiety must also deal with the meaning of threat as a psychological concept. I have previously proposed that the terms stress and threat be used to denote different aspects of a temporal sequence of events that results in the evocation of an anxiety reaction (Spielberger, 1972b). In keeping with this view, stress refers to the physical and psychological dangers that are objectively associated with the stimulus properties of a situation. These may include variations in environmental conditions or circumstances that occur naturally, or that are introduced and/or manipulated by an experimenter. In essence, stress denotes external stimulus conditions or situations that are characterized by some degree of objective danger as defined by an experimenter or as consensually validated by two or more observers.

Where stress refers to the objective stimulus properties of a situation, threat refers to an individual's perception of the situation as more or less dangerous or threatening for him. A situation that is objectively stressful is likely to be perceived as threatening by most people, but whether or not such circumstances are interpreted as threatening by a particular person will depend upon that person's subjective idiosyncratic appraisal of the situation. Moreover, objectively non-stressful situations may be appraised as threatening by individuals who, for some reason,

perceive them as dangerous. It is apparent, then, that the appraisal of a particular situation as stressful and/or threatening will be determined by an individual's past experience with similar situations as well as by the objective stimulus characteristics of the situation.

Anxiety, or more specifically state anxiety (A-State), refers to a complex emotional reaction that is evoked in an individual who interprets a specific situation as dangerous or threatening. If a situation is perceived as threatening, irrespective of the presence of real or objective danger (stress), the person who perceives the situation as threatening will experience an elevation in A-State. Thus:

STRESS → PERCEPTION OF DANGER (THREAT) → INCREASE IN A-STATE

An anxiety state may be defined in terms of the intensity of the feelings of tension, apprehension, and worry that are experienced by an individual at a particular moment in time, and by heightened activity of the autonomic nervous system that accompanies these feelings. Anxiety states vary in intensity and duration, and fluctuate over time as a function of the amount of stress that impinges upon an individual and the individual's interpretation of the stressful situation as personally dangerous or threatening.

Anxiety: State-Trait-Process

In the foregoing discussion, anxiety has referred to a transitory emotional reaction or state that results when an individual perceives a stressful situation as threatening. A precise conceptual

definition of the pattern of responses that characterizes anxiety as an emotional state (A-State) is a necessary precondition for meaningful research on anxiety phenomena. But the term anxiety is also used in the psychological literature to refer to a relatively stable personality disposition or trait and to a complex process which involves stress, threat, and A-State. A comprehensive theory of stress and anxiety will require clarification of the meaning of the concepts of anxiety as a transitory state, a personality trait, and a complex emotional process.

Trait anxiety (A-Trait) refers to relatively stable, individual differences in anxiety proneness. Differences in A-Trait are manifested in behavior in terms of the frequency that an individual experiences elevations in A-State intensity over time. Persons who are high in A-Trait, such as psychoneurotic patients, are more strongly disposed to perceive the world as dangerous or threatening than low A-Trait individuals. Consequently, high A-Trait persons are more vulnerable to stress and tend to experience A-State reactions of greater intensity and with greater frequency over time than persons who are low in A-Trait. The trait-state distinction in anxiety research was initially formulated by Cattell and Scheier (1961) and has been more recently emphasized by Cattell (1966, 1972) and Spielberger (1966, 1971, 1972b, 1972c).

It is now apparent that the term anxiety is perhaps most often used to refer to a complex personality process (Spielberger, 1972c). The concept of anxiety-as-process implies a theory of anxiety that includes stress, threat, and state and trait anxiety as fundamental

constructs or variables. In essence, anxiety-as-process refers to a sequence of cognitive, affective, physiological, and behavioral events that may be initiated by a stressful external stimulus or by an internal cue that is perceived or interpreted as dangerous or threatening. Cognitive appraisals of danger are immediately followed by an anxiety state reaction or by an increment in level of A-State intensity. While an anxiety state is at the core of the anxiety process, this process also involves stress and threat as fundamental constructs or variables.

The concept of anxiety-as-process is reflected in the traditional distinction between fear and anxiety. The term fear is generally used to refer to an emotional reaction to the anticipation of injury or harm from some real or objective danger in the external environment. Another defining characteristic of fear is that the intensity of the fear reaction is proportional to the magnitude of the danger that evokes it. In contrast, anxiety is traditionally regarded as an "objectless" emotional reaction because the stimulus conditions that evoke it are either unknown or the intensity of the emotional reaction is disproportionately greater than the magnitude of the objective danger. Thus, the traditional distinction between fear and anxiety is based on the assumption that similar emotional reactions result from the operation of different personality processes.

The empirical work of Lazarus and Averill (1972) and Epstein (1972) on stress and anxiety has involved the conception of anxiety as a psychobiological process. According to Epstein, anxiety is

the end product of a process in which arousal is produced by some form of threat and cannot be channeled into appropriate action. Similarly, Lazarus and Averill regard anxiety as "an emotion based on the appraisal of threat, an appraisal which entails symbolic, anticipatory, and uncertain elements ... anxiety results when cognitive systems no longer enable a person to relate meaningfully to the world about him." The Lazarus-Averill conception of anxiety thus implies a complex process that involves stress, cognitive appraisals of threat, and the absence of behavioral mechanisms that enable the individual to cope effectively with the stress. The end result of this process is an emotional (stress) reaction in which cognitive elements predominate.

Research on stress and anxiety obviously requires that attention be given to the process in which stressful stimulus conditions evoke state anxiety reactions. But process definitions of anxiety tend to lead to three major problems. The first stems from the fact that the anxiety process involves a sequence of events in which there are a number of components or variables. Typically, only those process variables of greatest interest to the theorist are incorporated in his definition of anxiety-as-process, and variables that are not included in the definition of anxiety tend to be neglected or ignored. Second, it is difficult to compare and integrate research findings based on process definitions of anxiety because each theorist incorporates different components of the anxiety process in his definition. A third difficulty is that standard terminological conventions are not yet available for

describing fundamental variables such as stress and threat that contribute to the anxiety process.

The Measurement of Anxiety

A comprehensive understanding of anxiety phenomena must begin with the definition and measurement of the response properties of anxiety as an emotional state. Since state anxiety is a psychobiological concept, both physiological and phenomenological indicants will be required. Various measures of autonomic nervous system activity have been employed in attempts to assess the physiological aspects of A-State. These have been reviewed by Martin (1961), Levitt (1967), McReynolds (1968), and, most recently, by Lader and Marks (1971). In terms of the volume of research, the galvanic skin response and changes in heart rate appear to be the most popular physiological measures of A-State. Blood pressure, muscle action potential, palmar sweating, and respiration have also been given considerable attention.

The earliest efforts to construct measures of the subjective feelings of apprehension, tension and worry that define the phenomenological component of anxiety states were carried out by Nowlis (1961; Nowlis & Green, 1965), Cattell and Scheier (1961), and Zuckerman (1960; Zuckerman & Lubin, 1965). At the present time, Zuckerman's Affect Adjective Check List and the A-State Scale of the State-Trait Anxiety Inventory (Spielberger, Gorsuch & Lushene, 1970) are the self-report instruments most widely used for assessing the phenomenological component of anxiety states. A new multidimensional instrument for the assessment of moods, the Profile of

Mood States (POMS), also includes a self-report scale for measuring A-State (McNair, Lorr, & Droppelman, 1971).

The Taylor (1951, 1953) Manifest Anxiety Scale and the Mandler-Sarason (1952; Sarason & Mandler, 1952) Test Anxiety Questionnaire were the first of a number of psychometric instruments developed to assess individual differences in anxiety in adults. Other instruments designed to assess anxiety in adults include those constructed by Cattell (1957); Cattell & Scheier (1963); Endler, Hunt and Rosenstein (1962); Freeman (1953); McReynolds (1968); Spielberger, Gorsuch and Lushene (1970); Welsh (1956); and Zuckerman (1960). A number of self-report scales have also been developed for measuring general and test anxiety in children (e.g., Castaneda, McCandless & Palermo, 1956; Sarason, Davison, Lighthall, Waite & Ruebush, 1960; Spielberger, Edwards, Montuori & Lushene, 1970).

Most of the scales developed to assess anxiety appear to measure trait anxiety, that is, individual differences in anxiety proneness. The Manifest Anxiety Scale (Taylor, 1953), the IPAT Anxiety Scale (Cattell & Scheier, 1963), and the A-Trait Scale of the State-Trait Anxiety Inventory (Spielberger, et al., 1970) are the instruments used most often in current research for the assessment of trait anxiety in adults. These three scales are highly correlated with one another and appear to measure anxiety proneness in social situations (Spielberger, et al., 1970). The research evidence suggests that individuals who obtain high A-Trait scores are strongly disposed to experience elevations in A-State in situations that pose threats to self-esteem, and, especially, in interpersonal

relationships in which personal adequacy is evaluated (Spielberger, 1966, 1971, 1972b, 1972c).

In general, situation-specific trait anxiety measures are better predictors of elevations in A-State intensity in a particular type of stress situation than are general measures of A-Trait. It has been found, for example, that an A-Trait measure designed to evaluate the disposition to experience anxiety in a speaking situation was a better predictor of increased levels of A-State in students required to give impromptu talks than a general A-Trait measure (Lamb, 1969). Similarly, a "Fear of Shock" questionnaire predicted increased heart rate in students threatened with electric shock, whereas changes in heart rate were not related to scores on a general measure of A-Trait (Hodges & Spielberger, 1966). Thus, individual differences in the disposition to manifest anxiety states vary from one stress situation to another, and situation-specific A-Trait measures are better predictors of elevations in A-State intensity than general measures of A-Trait.

Test anxiety scales are moderately correlated with general measures of A-Trait, and persons who score high on such scales perform poorly in evaluative or test-like situations. Hence, test anxiety scales appear to measure individual differences in a disposition to experience A-State elevations of high intensity in situations in which personal adequacy is evaluated. According to Sarason (1972), high test-anxious individuals are more likely to emit personalized, self-centered responses that interfere with performance than persons who are low in test anxiety. Apparently,

these self-critical responses are cued off by A-State reactions evoked in high test-anxious people by the stresses associated with evaluative situations.

Since the concept of anxiety-as-process implies a theory of anxiety, the measurement of anxiety-as-process requires the assessment of each of the variables that are specified in the process theory. In addition to measures of state and trait anxiety, the evaluation of anxiety-as-process would involve the measurement of objective stress and the cognitive appraisals and reappraisals that determine the subjective threat that is experienced by an individual. A comprehensive theory of stress and anxiety must also take into account coping and avoidance behaviors and psychological defenses that serve to alleviate state anxiety. Thus, progress in research on stress and anxiety will require a comprehensive theory that articulates the relationships among the fundamental variables that define these areas and the specification of precise operations for the measurement of the critical variables that influence anxiety and its effects on behavior.

A Critical Appraisal of Research Needs on Stress and Anxiety

In the preceding discussion, I have attempted to identify important conceptual and methodological issues that are encountered in research on stress and anxiety. Within these general areas, the range and variety of research is extremely broad and heterogynous. Consequently, clarification of research needs requires evaluations of significant subareas of research by behaviorsl scientists

who are familiar with these more limited fields. The designation of specific subareas of research in the papers that follow was based on the writer's judgment as to the major concentration of research efforts on stress and anxiety over the past twenty years. The authors of each of the following papers is a respected authority on his assigned topic and an important contributor to the scientific literature on stress and anxiety.

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II. Stress Research

James R. Averill
University of Massachusetts, Amherst

A reasonable beginning to a review of stress research would be a definition of "stress." It would be impossible to give such a definition within a short space, however, without being both dogmatic and restrictive -- and little would be gained by being either. As Kaplan (1964) and others have pointed out, a degree of vagueness is sometimes necessary and advantageous in scientific concepts, especially in areas of research which are undergoing rapid development and change. Certainly, stress research is one such area. In its broadest psychological sense, "stress" has been used as a generic term for states of negative affect (and/or the conditions which lead to such states). This usage covers two related topics: (a) specific emotional reactions, e.g., fear, anger, grief, etc., and (b) such nonspecific or generalized states as anxiety, conflict, and frustration. The present review will deal with both topics. Specifically, we shall touch upon four broad areas of research and theory: (a) the relationship between physiological and psychological stress reactions; (b) the cognitive mediation of stress and emotion; (c) role of coping responses in the development of stress reactions; and (d) the social determinants of emotional behavior.

The task of this review has been made easier by the appearance in recent years of a number of volumes dealing with emotion, stress, and coping (Appley & Trumbull, 1967; Arnold, 1970; Glass, 1967; Hamburg & Coelho, in press; Izard, 1971; Lazarus, 1966; McGrath, 1970; Spielberger, in press; Tobach, 1969). Moreover, several of these volumes contain chapters addressed specifically to the problem of

future needs in stress research (see especially, McGrath, 1970, and also Hamburg & Coelho, in press). There would be little value in going over this well-ploughed ground again. The present review, therefore, will take some latitude in emphasizing theoretical issues as well as research needs.

The Relationship between Physiological and Psychological Stress Reactions

The immediate impetus and popularity of the concept of stress came from physiology, and in particular, from Selye's (1956) analysis of the General Adaptation Syndrome (GAS). Selye's formulations are so familiar as to require no summarization here. Suffice it to note that literally thousands of reports have been published during the past several decades dealing with physiological stress reactions. Many problems remain to be solved, but there does not appear to be any dearth of interest in this aspect of stress research. Quite the contrary -- from a psychological point of view, the emphasis placed on physiological stress mechanisms has helped to draw attention away from other aspects of the problem, such as the role of cognitive, behavioral, and social factors in stress. These latter three sets of factors form the primary focus of the present review. Before proceeding to them, however, a few words might be said regarding potential relationships between physiological and psychological stress reactions.

By way of clarification, physiological stress is generally defined as nonspecific changes in physiological systems -- e.g., the pituitary-adrenal axis -- due to physical injury or to any other of a wide variety of "stressor agents." Psychological stress is a

broader concept, including behavioral and cognitive changes, as well as physiological. More importantly, the distinction between physiological and psychological stress has generally been made on the basis that the latter involves the perception of threat by the organism. As we shall see below, this distinction may not be entirely valid.

Some parallels. There are many potential parallels which can be drawn between physiological and psychological stress reactions, and some of these may have considerable heuristic value. Two examples will suffice to illustrate the point. One of the major aspects of physiological stress emphasized by Selye is the change in reaction over time, i.e., from the initial alarm reaction, to the stage of resistance and ultimately the stage of exhaustion. Leaving aside the exact symptomatology proposed by Selye, the temporal changes he has outlined are perhaps descriptive of a variety of systems under stress, whether physiological, psychological, or social. Berrien (1968), for example, has applied a Selye-type analysis to groups under stress, indicating that perhaps we are dealing here with a formal property of systems in general. Be that as it may, the main point to be emphasized is that the study of psychological stress must take into account possible temporal changes in response patterns. This same point has been made by numerous commentators on contemporary stress research. It is worth emphasizing again, however, because most experimental research is still largely a-temporal; a limitation imposed, no doubt, by the exigencies of the laboratory setting. (For a notable series of studies which does take extended time-periods into account, see Leventhal, 1970.)

Another potentially fruitful analogy between physiological and psychological stress reactions has been pointed out by Bakan (1968). The physiological changes which accompany the GAS, e.g., inflammation, may themselves place severe wear and tear on tissues, resulting in what Selye calls "diseases of adaptation." In other words, adaptive changes in some components of the physiological system in response to stress may become -- if too extreme or prolonged -- maladaptive from the point of view of the system as a whole. Baken has noted the close resemblance between this process on a physiological level and Freudian defense mechanisms on a psychological level. The latter form the nucleus of many neuroses, which might be considered "diseases of psychological adjustment."

Too often, psychological defenses have been viewed as inherently maladaptive. But psychological defenses in-and-of themselves are not maladaptive, any more than are the body's physiological defenses. Stated differently, the responses which accompany psychological stress reactions are the manifestation of normal processes which are also operative in nonstress situations (cf. Haan, 1969). An important implication follows from this: To date, most stress research has focused on unusual or crisis situations; much might be gained if greater attention were paid to how normal people cope with the everyday problems of living (cf. Hamburg & Adams, 1967).

A possible interconnection. Many more parallels could be drawn between physiological and psychological stress reactions, but, obviously, there is not space to do so here. Besides, there is a more basic question which must be asked: To what extent are such parallels "mere analogies" (and hence to be interpreted with

considerable caution), and to what extent are they indicative of common underlying mechanisms? Specifically, the possibility exists that physiological stress is only one part of a broader stress syndrome which includes psychological factors as well.

The stressors used in most physiological research (e.g., prolonged cold, physical injury, etc.) have tended to produce such obvious bodily trauma that their psychological impact generally has been ignored. In concluding an extensive review of psychoendocrine response patterns, J. Mason (1968) has called attention to this oversight, pointing out that many of the traditional "physical stressors" produce little effect on the endocrine system unless they are part of an emotion-inducing context. He asks what is undoubtedly one of the most fundamental questions to be addressed by future stress research:

> In the light of present knowledge of the keen sensitivity of the pituitary-adrenal cortical system to psychological influences, is it not disturbing to consider that most if not all of the situations described by Selye very likely involve some degree of emotional reaction, discomfort, or pain as well as the designated 'nocuous stimuli'?
>
> Does the widely occurring pituitary-adrenal cortical response, then, reflect a 'general adaptive' or 'nonspecific' endocrine response to many different 'nocuous' stimuli or does it reflect a specific response to a single type of stimulus (psychological) which these various unpleasant situations share in common? (p. 800)

The Cognitive Mediation of Stress and Emotion

The above quotation from Mason highlights the potential importance of cognitive processes even in stress research which purports to be strictly physiological. And, almost by definition, cognitive factors are of central importance to any analysis of psychological

stress. In this section, we shall examine some of the problems involved in the investigation of the cognitive mediators of stress and emotion, with the focus on specific emotional reactions.

Perhaps the change of focus from generalized stress reactions to specific emotions deserves some explanation. In the previous section, the parallels between physiological and psychological stress reactions were emphasized, the former being defined as a nonspecific syndrome. Nonspecificity, however, is one parallel between the concepts of physiological and psychological stress which we do not choose to follow. The reason is partly strategic: The study of specific emotions has always been on the periphery of academic psychology (as opposed to the study of specific diseases in medicine); limiting the concept of psychological stress to nonspecific reactions would only exacerbate this trend. In any case, the argument for limiting the concept of stress to nonspecific reactions is largely academic, since many investigators already discuss the negative emotions under this rubric.

The disjunction between cognition and emotion. Among the arguments for distinguishing stress reactions from specific emotions is a suggestion by Sells (1970) that stress results from a loss of "response control." Sells further argues that response control belongs to the "cognitive system" whereas the emotions do not. The question of response control will be taken up in the next section. The reason for mentioning Sells' position at this point is that he seems to be arguing for a disjunction between cognition and emotion, which is central to the issues addressed in this section. The disjunction between cognition and emotion runs deep in Western thought;

it is, however, largely symbolic and prejudicial (Averill, 1969). More specifically, it stems from the fact that emotional concepts carry the connotation of passivity (Peters, 1962), not with respect to the body (for emotional reactions may be quite vigorous), but with respect to the intellect and will. This connotation has led to a number of contrasts between emotion and other behaviors, contrasts which are based on ethical and philosophical considerations extrinsic to scientific analysis. Since the time of the Greeks, for example, the Western intellectual tradition has honored rational action and has degraded its opposite, passion. Added to this is the Judeo-Christian emphasis on freedom of the will as a prerequisite to moral behavior, and hence, an emphasis of voluntary as opposed to involuntary (emotional) behavior. Under these prevailing cultural assumptions, it is not surprising that emotions have come to be viewed as associated with man's baser qualities -- they are noncognitive, primitive, animal-like (instinctive), and visceral.

A major purpose of the present review is to argue against the above disjunction between cognition and emotion; or, stated more positively, to argue for increased research into the cognitive mediators of emotion. Some start has already been made in this direction (e.g., Antrobus, 1970; Arnold, 1960; Broadbent, 1971; Holt, 1967; Kelly, 1955; Lazarus, 1966; Schachter, 1964). Still, most analyses of the cognitive mediators of stress and emotion have remained rather superficial, more a matter of emphasis or frame-of-reference than of specific theory. Let us take a few examples. Perhaps the most ambitious and comprehensive attempt to analyze emotional behavior from a cognitive point of view is that by Magda

Arnold (1960). In spite of the richness of her work, Arnold's analysis of the appraisal processes during emotion goes little beyond what can be found in the writings of Thomas Aquinas (cf. Summa Theologiae, questions 22-48). This is not an aspersion on the originality of Arnold's work; rather, it is simply to note how little psychological theories of emotion have advanced. Other cognitive approaches to the study of emotion fare little better than does that of Arnold, and most not as well. Thus, Lazarus, Averill, and Opton (1970) have also emphasized the role of appraisal during stress and emotion, but have gone little beyond a statement of position and the outline of certain strategies by which emotional appraisals might be investigated.

Research needs. On a very general level, two main research needs may be mentioned with regard to the cognitive mediation of stress and emotion. First, the specific appraisals which underlie each emotional state (and nonspecific stress reactions, too) must be specified. For example, how does a person have to perceive or interpret a situation before there will be anger, say, as opposed to fear, anxiety, depression, or some other affective state? As Peters (1969) has emphasized, this is a conceptual as well as an empirical issue; that is, part of the meaning of the concept of anger is that there are appraisals of a certain type, and these appraisals are different from those presupposed by the concept of fear, etc. One does not necessarily have to go into the laboratory to "discover" these conceptual relationships; empirical research, however, can be an important stimulus to logical analyses, as well as being necessary for verification.

Turning now to the second main area of research need, the various aspects of information processing which are subsumed under the notion of cognition must be spelled out and related to emotional behavior. Simon (1967) has offered one suggestion as to how this might be accomplished, namely, by considering emotions analogous to "interrupt systems" in computer programming. Suggestions such as this need to be followed up systematically; a task which is made difficult by the traditional division of labor between psychologists interested in cognitive processes, on the one hand, and those interested in affective states, on the other.

The Role of Coping Responses in the Development of Stress Reactions

Many investigators have commented upon the importance of coping responses in determining the presence or absence of stress. Since we have already cited Sells (1970) in connection with the disjunction between cognition and emotion, it might be appropriate to mention his stand with regard to coping responses also. According to Sells, stress occurs when two conditions are met: (a) the individual is called upon to respond under circumstances in which he has no adequate response available; and, (b) the consequences of not responding are important to the individual. These conditions, Sells claims, provide "a new principle to distinguish stress from other phenomena of human behavior" (p. 139). It is certainly the case that this principle has considerable intuitive appeal as well as empirical support, if not as a definition of stress (cf. Mandler & Watson, 1966, for a definition of anxiety along similar lines), then at least as a statement of conditions under which stress will arise. Considerable research on both the animal (e.g., Seligman, Maier, &

Solomon, 1971; Weiss, 1968, 1970) and human (e.g., Cook & Barnes, 1964; Corah & Boffa, 1970; Hokanson, DeGood, Forrest, & Brittain, 1971) levels has demonstrated that the availability of a coping response may greatly alleviate stress reactions. Nevertheless, there are grounds for caution in overgeneralizing these findings. In the first place, we have already indicated some dissatisfaction with any analysis of stress which excludes standard emotional reactions. In a sense, emotions such as anger, fear, etc., are well organized attempts to cope with threatening situations. In these instances, it is not the lack of a response, but the nature of the response which leads us to speak of stress. We shall have more to say about this aspect of emotion in the next section. But even if we limit discussion to nonspecific stress reactions, there are still difficulties in associating stress too closely with the lack of coping responses.

Stress induction versus reduction. There are circumstances under which the availability of a coping response may lead to increased rather than decreased stress. Perhaps the classic example of this is Brady's executive monkey (Brady, Porter, Conrad, & Mason, 1958). The "executive" was the member of a yoked pair who had control over the delivery of shock, and also the one who developed ulcers and died. The fact that these original findings have been difficult to replicate (Weiss, 1968) serves to highlight how little we know about the relevant variables which lead to increased stress when coping responses are available. Similar or related findings, moreover, have frequently been observed in humans. For example, Epstein (1967) has observed that sport parachutists show the greatest

degree of stress before they commit themselves to a jump, i.e., while they still have control over whether to jump or not.

Relinquishing control. In addition to coping responses sometimes leading to increased rather than decreased stress, other relationships have also been observed. Thus, giving into "fate" is a frequently reported defense mechanism. It would appear that under certain circumstances, at least, it is more comforting to relinquish control than to exercise it. To add a further complication, the tendency to relinquish control may be so strong on the part of some individuals that they will not avail themselves of a readily available coping response even when such denial is ineffective in reducing stress (Averill & Rosenn, 1971).

Preparation for stress. The above discussion raises another important question: How can a person be prepared for, or trained to cope with threat? This question can be broken down into (a) the acquisition of skills adequate to meet potential threats, and (b) the motivation or incentive to use those skills. Outside the context of the military, there has been little systematic investigation into the means by which effective coping behavior is acquired or the conditions under which it is utilized. Obviously, this is a very broad question and we can only note its importance here. However, we shall devote the next and final section of this review to a related problem; namely, the social determinants of emotional behavior. For the present, it is sufficient to note that the relationship between coping responses and stress reactions is extremely complex and little understood. (For further discussion of this and related topics, see especially, Hamburg & Coelho, in press.)

The Social Determinants of Emotional Behavior

In the preceding sections, we have suggested first, that the traditional disjunction between cognition and emotion is unwarranted, and second, that emotions are among the set of socially prescribed coping responses. The present section will carry this line of argument further by examining the social determinants of emotional behavior. Specifically, we shall argue that standard emotional reactions such as anger, fear, etc., are social constructions and, hence, serve social as well as personal and biological functions. In a sense, we are extending to the area of emotion a line of analysis commonly known as the "sociology of knowledge" (Berger & Luckman, 1966). A complete argument obviously cannot be developed within the space of a few paragraphs; by sketching the broad outlines of an argument, however, it is hoped that needed areas for future research may be highlighted.

Emotions as social constructions. It has long been recognized that the eliciting conditions for, and the expression of, emotional reactions are subject to cultural influence. Nevertheless, most theorists have tended to treat cultural differences in emotion as superficial variations imposed on basic biological substrata (a position epitomized by McDougall, 1936, but adhered to in more subtle forms by many current psychologists). The theme of the present argument is that there are no core aspects of emotion which are not also fundamentally and essentially influenced by culture. In so emphasizing the importance of sociocultural influences, we are not opting for a complete cultural relativism as represented, say, by Birdwhistell (1963). We do, however, assume a considerable

indeterminancy in the biological predeterminants of emotion, an assumption which is not unwarranted even in the case of subhuman primates. Thus, in concluding a review of the effects of infantile deprivation, W. Mason (1968) concludes:

> All these observations suggest that the number and variety of discrete motor acts, and the tendency to combine such acts spontaneously into new and more complex patterns, increases progressively from monkey to man. One of the pathways toward human behavior thus seems to be a 'loosening' of motor patterns, and we can already see the process at work in the great apes. That a similar change has occurred in the internal mechanisms that govern behavior seems most likely.
>
> In my own work with young chimpanzees I have found it necessary to speak in terms of a generalized motivational state, because more specific motives--fear, aggression, hunger, sex--do not seem to be able to provide a satisfactory account of their behavior. (p. 99)

Let us first present in abstract terms what might be called a constructivist view of emotion. To begin with, the biological predeterminants of emotion (the "generalized motivational states" described by Mason) may be conceptualized as broad behavioral systems along the lines adumbrated by Scott (1969) and especially Bowlby (1969). A behavioral system is a set of response elements which tend to occur together and which serve some broad adaptive function. However, the elements within a system are only loosely interrelated, i.e., they may also occur semi-autonomously. This means that they may enter into various combinations to form specific response patterns. According to a constructivist view of emotion, only some of the elements which comprise an emotional response pattern are biologically based (e.g., certain expressive reactions and physiological changes); others are socially and even individually determined. Moreover, society provides the rules (norms and expectancies) which in large part shape the final response pattern.

A specific example may help clarify the above line of argument. The evolution of group living was a major biological adaptation of higher primates. There is thus a strong predisposition for attachment to members of one's species. This predisposition may be conceptualized as a behavioral system consisting of such response elements as smiling, clinging, following, crying, and the like (Bowlby, 1969). In humans, this behavioral system has been shaped by different societies into a great variety of more specific response patterns. Some of these patterns have remained fairly close to the biological level, as examplified by the grief reaction when social bonds are broken (Averill, 1968). Other patterns show to a greater degree the influence of cultural norms and values, as well as individually acquired response elements. For instance, the Japanese seem to have molded from attachment behavior an emotion amae, which is experienced by them as extremely basic and fundamental (Doi, 1962). There is no equivalent for amae in European languages, although "dependency" (without its negative connotation) carries some of the meaning. The constructivist view of emotion being presented here would go even further and suggest that people with a European cultural background do not experience an emotion equivalent to amae. This does not mean that attachment behavior is less important for Westerners, only that different types of response patterns are constructed from it.

To summarize briefly, emotions traditionally have been considered as phylogenetically primitive and closely associated with biological processes. According to this view, affective processes are relatively unaffected by man's higher mental activities, including culture (which, following Tyler, 1969, may be defined in terms of cognitive

organization). But emotion and cognition are not separable phenomena and similar considerations apply to both. This means that investigations into the social determinants of thoughts are relevant to affective processes also. Until recently, however, the "sociology of knowledge" has been primarily concerned with intellectual activity and has neglected the problem of emotion. A constructivist view of emotion, in which emotional responses are treated as socially constituted coping responses, is intended to help correct this imbalance.

Functional significance of emotional behavior. The above argument would suggest that emotional reactions have social as well as personal and biological significance. On one level of analysis, we have already indicated what this function might be: Emotions are socially prescribed ways of coping with challenges which tax an individual's resources. Emotions do not, of course, exhaust the set of socially prescribed coping behaviors. They may be distinguished from nonemotional ("instrumental") coping responses in that the cause of an emotional reaction is generally attributed to an outside agent, not to the actor himself (one is "gripped," "seized," etc.). During emotion, an individual is allowed to abjure, to a limited extent, the responsibility for his actions. Herein lies the clue to the social function of emotional behavior.

Consider the case of a person who kills in a fit of anger. He is liable to be found less guilty than one who kills with premeditation. In a sense, the society is saying, "Thou shall not kill," while at the same time providing an escape hatch. Under certain circumstances (e.g., an unjustified affront), an attack may be allowed and even encouraged. But the attack must be carried out in such a

way as not to violate the general proscription against intentionally harming another. An illustration from another field of inquiry might be useful in explicating the dynamics of this process. A neurotic suffering from hysterical blindness may be greatly troubled by his affliction and go to great lengths to seek help. On a deeper level of analysis, however, the blindness is a product of his own intrapsychic conflicts. It is a way of coping which the person cannot recognize or condone as such, and yet which fulfills a definite function in maintaining psychic equilibrium. By analogy, emotions might be considered hysterical-like phenomena on a cultural as opposed to an individual level. Thus, emotions such as anger may be discouraged and even condemned in terms of explicit cultural values; at the same time, they may be encouraged as ways of coping with conflicts which sometimes arise within the social system. (On this point, see Newman's, 1964, analysis of amok-like reactions among New Guinea highlanders.)

Although the preceding analysis has used the emotion of anger as an example, the basic argument is readily extrapolated to other standard emotions, even to such positive states as romantic love (cf. Greenfield, 1965; Rosenblatt, 1967). This is not the place, however, to pursue the topic further.

Implications. If the above analysis is correct, or at least in the right direction, it poses several important problems for stress research. On the most general level, it means that analyses of stress and emotion must take greater cognizance of sociocultural influences than has been customary in the past. This means more emphasis on systematic field research, especially that which takes

into account cultural (or subcultural) variables. To date, most stress research has been conducted in laboratory settings, and what field research there is has concentrated primarily on crisis situations (e.g., Lucas, 1969) or unusual environments (e.g., Rasloff & Helmreich, 1968). Parenthetically, it might be added that the need for more field research stems not only from theoretical considerations. It is also becoming increasingly apparent that many laboratory experiments do not have "ecological validity," i.e., their results cannot be generalized to real-life situations (Barker, 1968). This is not an indictment against laboratory research as such, the advantages of which are well recognized and cannot be gainsaid; rather, it is another indication of the need for greater flexibility in both theory and research.

Another implication stems from the above analysis; namely, to the extent that society fosters a particular form of coping, that response will fulfill societal needs in addition to whatever individual functions it might serve. The significance of this for stress research, especially applied research, stems from the fact that societal and individual needs often may be in conflict. Indeed, such conflict is itself an important source of stress. Similar considerations regarding potential conflict also apply, of course, to non-emotional or instrumental coping responses. However, we have chosen to focus attention on emotional reactions for these generally have not received the attention they deserve in psychological theory, especially when viewed from a sociocultural perspective.

Concluding Comments

In terms of length, this review has considerably overextended its bounds. The subject matter seemed too broad, and the time commitment was too short, to allow a more concise statement. Yet, what has been said is obviously incomplete. Many problems in need of research simply have not been mentioned. It goes without saying that any enumeration of specific research problems could include only a small sample of the total possible, and a very biased sample at that. It thus seemed better to concentrate on general issues, even at the risk of climbing out on a theoretical limb or two. If the review has managed to place a few of these general issues in a slightly new perspective, no matter how imperfectly, then it has achieved its main objective.

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III. The Measurement of Anxiety

Paul McReynolds
University of Nevada

Introduction. Anxiety is one of the central constructs in psychology. It plays a central role in personology, learning theory, psychopathology, and other fields. Yet our understanding of the nature and conditions of anxiety remains, on the whole, at a relatively elementary level. Further theoretical advance in this field is thus of crucial importance. Systematic research and useful theoretical development in the area of anxiety, however, cannot proceed more rapidly than the various techniques for the measurement of anxiety permit. As in all science, solid theoretical progress is largely dependent upon the availability of an advanced measurement technology.

On the whole, the level of sophistication of scientific anxiety assessment has increased rather notably in the last ten years. It has come to be generally recognized that (a) the concept of anxiety is not a simple one, but rather involves a number of complexly interrelated aspects; and (b) the development of adequate anxiety assessment devices cannot be accomplished casually, but rather requires the full application of modern test construction methodology.

These developments are highly salutary. Their implications for the state of anxiety assessment are, however, more potential than actual, and it is not at all difficult to point up a number of highly important research needs and difficult problems in this area, as the material below will indicate. Nevertheless, it is possible, I think, to feel fairly optimistic about the outlook for advances in anxiety measurement.

Conceptual problems and needs. A major problem in anxiety assessment has been that of adequately conceptualizing what one is trying to measure. This problem encompasses--but is not limited to--the difficulty of satisfactorily defining anxiety, and relates, ultimately, to the need for a fully comprehensive and viable theory of anxiety. A number of important advances have recently been made toward the conceptual analysis of anxiety, including: (a) the distinction between trait and state anxiety (Cattell & Scheier, 1961; Spielberger, 1966, 1971), which points up the difference between the degree of anxiety one is experiencing here and now and one's general proneness to anxiety; (b) the distinction between current and characteristic anxiety (McReynolds, 1968), where "current" is essentially the same as "state," but "characteristic," unlike "trait," refers to one's general, typical level of anxiety; and (c) the distinction between specific areas of anxiety (e.g., test anxiety, separation anxiety, etc.) and overall anxiety. I have suggested elsewhere (McReynolds, 1968) that there are at least eight different classes of anxiety variables that can be assessed: be this as it may, it is clear that anxiety is conceptually complex. The situation is further compounded by the difficulty in distinguishing, both introspectively and empirically, between anxiety and other negative affects, such as fear, depression, guilt, and apathy. Additional distinctions can be made between situational anxiety, dispositional anxiety, and concurrent anxiety (Murray, 1971). What is lacking, it seems to me, is a careful, detailed overall conceptual analysis of the concept of anxiety. By "conceptual analysis" I mean a logical examination of a given concept along the lines practiced by modern linguistic

philosophers. Correlational methods, including factor analysis (e.g., Cattell & Scheier, 1961; Fenz & Epstein, 1965; Hundal, Singh, & Singh, 1970), can also be useful in further clarifying the different measures--and the different meanings--to be brought under the umbrella of anxiety.

Experiential aspects of anxiety. The common conception of anxiety is as a particular phenomenal experience, and scientists ignore this meaning at their peril. For many years, experiential anxiety was effectively ruled out of psychology, on the basis that it could not be studied in animals, but this era happily is passing, and the tendency now is to emphasize felt anxiety. This trend is indicated, e.g., in the increased usage of adjective checklist measures of anxiety (e.g., Nowlis, 1965; Zuckerman & Lubin, 1965) and of the new State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) which directly assess the subject's phenomenal state. It is to be doubted, however, that any of the current instruments do full justice to the intricate nuances of felt anxiety. The existentialist approach to the study of anxiety is, after all, older than that of Freud, and Fischer (1970) has recently presented a strong case for the deeper study of experiential anxiety. It seems likely that more careful considerations of the various qualities of experienced anxiety would contribute to improved assessment.

The psychophysiology of anxiety. Whether or not one wishes to define anxiety in physiological terms, it is clear that there are important relationships between anxiety and physiological variables (Averill & Opton, 1968; Lader & Wing, 1966; Lader, 1969). For many years, autonomic indices have been used to measure anxiety. The

relationships between introspective and physiological measures of anxiety constitute an area strongly in need of more definitive work. In general, the evidence indicates (McReynolds, 1967) that resting level autonomic and electromyographic readings correlate very low, if at all, with psychological trait measures of anxiety. Despite this fact, researchers regularly and blithely utilize psychological and physiological measures as if they were interchangeable. It is extremely important to ascertain the conditions under which psychological and physiological measures are, and are not, equivalent. Attempts to do this will necessarily involve a systematic distinction between two laboratory methods of studying anxiety: (a) induced anxiety; and (b) base anxiety (McReynolds, 1967). Thus, there is reason to believe that physiological measures of induced anxiety may correlate highly with introspective measures of state anxiety. This whole important area, however, is in striking need of both empirical and theoretical clarification.

Attempts to measure anxiety by physiological means have been handicapped by an over-simplistic approach on the part of many psychologists. Thus, different autonomic measures are often treated as interchangeable, despite the fact that they frequently intercorrelate extremely low. Though there have recently been a number of outstanding advances in autonomic measurement technology--the use of forearm blood flow (Kelly, 1966; Kelly & Walter, 1968) as an index of anxiety, to mention only one--these have generally not been adapted into the mainstream of psychological work on anxiety. The equally important role of biochemical measures in the assessment of psychological variables, including anxiety, has been even more

overlooked by most psychologists. This area has recently been reviewed by Barchas, Stolk, Ciaranello, and Hamburg (1971).

Pencil-paper measures. These remain the most widely used techniques for measuring anxiety, and this fact can be expected to continue. In view of the dozens of anxiety scales that already exist, it could hardly be held that there is a need for new scales as such. Most of the existent tests, however, were rather casually put together, by current psychometric standards, and will gradually disappear from use. The great need is to develop instruments, according to rigorous standards, that are specifically designed to measure particular dimensions of anxiety--dimensions which are themselves derived from the conceptual and correlational analyses referred to above. The day when one can simply put forth a test of "anxiety," or when an individual can be said to be high or low on "anxiety," without further specification, is gone.

The most progress is currently being made in the development of self-report forms which focus on feelings (rather than on somatic symptoms) of anxiety (or its absence): these include not only the adjective checklists referred to earlier, but also the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970), which very usefully provides separate measures of trait and state anxiety. There is a need, however, for the development of additional specific anxiety measures. An example of such an instrument would be one that broadly sampled particular areas of stimulus input (e.g., test anxiety, homosexual anxiety, anxiety regarding authority figures) in order to specify the particular areas in which one is most prone to anxiety; an analogous approach could concern specific areas of state anxiety.

An important defect in most current standard scales is that they are concerned exclusively with intra-individual components of anxiety, i.e., they overlook entirely the fact that anxiety arises as a function of interaction between the person and his environment. The pioneer work of Endler, Hunt, and Rosenstein (1962) demonstrated the validity of this latter view, and provided an instrument (The S-R Inventory of Anxiousness) consonant with the approach. The implications of this work, however, have not been sufficiently followed up, and no broad, generally usable instrument exists for the meaningful evaluation of situational determinants of anxiety.

Other Approaches. Despite the convenience of pencil-paper techniques, it would be an error to rely upon them too heavily. Anxiety is manifested also in observable behaviors--in one's posture, his gait, and his speech. It is not easy to specify what the "gaps" in current knowledge are in these areas, but it should be clearly understood that research in these areas is important, and should be encouraged.

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IV. State and Trait Anxiety

Marvin Zuckerman
University of Delaware

The traditional trait test, whether objective or projective, typically yields a general trait assessment which ignores the specificities of individual responses and situations. A person may be characterized as "anxious," "introverted," or "neurotic." Clinicians of any persuasion might well ask: "How is his anxiety expressed and in what situations is it expressed?" Clinicians or researchers might also want to measure anxiety as a state, or response, over the course of repeated contacts with the subject. Most trait tests do not lend themselves to use as state measures.

A typical view of traits assumes that: (1) traits are systems or dispositions within the person that predispose him to perceive situations in particular ways and to react in a reliable manner in a wide variety of situations (Allport, 1937; Spielberger, 1966) (2) the trait is a summary of the frequency and intensity of past states and can be validly assessed by asking the individual to describe himself as he is "generally," "often," or "usually" (Spielberger, 1972, in press).

Until recently, personality psychology has been preoccupied with trait measurement and has neglected the measurement of states and change. A remarkable amount of time and energy has gone into an attempt to define the "dimensions of personality" through factor analyses of trait measures. These efforts have not brought about the rapproachment between Cronbach's (1957) "two psychologies," individual differences and experimental psychology. Most experimentalists are not interested in "personality structure" any more

than they were interested in the "structure of the mind." A new breed of behavioristic clinician shares this dissatisfaction with the traditional trait approach (Mischel, 1968).

From a behavioristic viewpoint, personality is what a person does, or his reliable modes of behavior in specified situations. In a less rigidly behavioristic mode, personality is also what we infer about a person's typical experiences in specified situations, providing he can communicate his experience verbally or observably. States are, of course, hypothetical constructs, as are traits, but state measures are responses of interest in themselves, while trait measures are of no interest except insofar as they can predict responses. Most trait measures are simply a sampling of a person's self-labeling habits or retrospective and generalized accounts of past states. While trait tests may be all that we can use in a limited contact with a person they represent a poor attempt to assess his typical response patterns and their relationships to the typical situations in his life. Mischel (1968) and others have criticized the trait concept because it leads to reification and is based on self-reports which are poorly correlated with overt behavior. Edwards (1957) has asserted that most anxiety or neuroticism measures are simply a measure of the extent to which a person describes himself in a socially desirable or undesirable manner.

In certain semi-controlled settings, such as laboratories, clinics, classrooms and hospitals, psychologists can repeatedly assess a person's reactions. Such longitudinal assessments for delimited periods are likely to provide personality descriptions which are superior to retrospective reports of dubious validity.

Almost everyone would agree that anxiety, and other affective responses, fluctuate as a function of situations and conditions of the organism. Affective levels change markedly under stress, threats, therapy sessions, changes in jobs, roles, weather, news, alcohol content of the blood, and menstrual cramps. Why should a measure of affect be stable over time? The very essence of a trait test is its stability over time and this is what makes it an insensitive index of behavioral change. The recognition of the inadequacy of trait tests for measuring change has led a number of researchers to develop state tests for affects. Spielberger (1972) has summarized the history of the attempt to measure "anxiety as an emotional state" and this article will only deal with measures in wide current use.

Clyde (1963), Lorr (1971), and Nowlis (1965) have used adjectives which the testee rates to describe his mood on a 1 to 4 scale. They have used factor analysis to isolate small clusters of words on which responses tend to be correlated. Clyde's anxiety factor, which he labels "Dizzy," consists of "sick to the stomach," "dizzy," "jittery" and "shaky." Nowlis' Anxiety factor contains "clutched up," "fearful," and "jittery." Lorr's Tension-Anxiety factor is defined by "tense," "nervous," "shaky," "on edge," "panicky," "uneasy," "restless," "anxious" and, scored in a reverse direction, "relaxed." Zuckerman (1960) developed an affect adjective checklist measure of anxiety using an empirical method, rather than a factor analytic method, for item selection. The words used frequently by anxious patients, and normals in hypnotically suggested anxiety states to describe their current mood were: "afraid, desperate, fearful, frightened, nervous, panicky, shaky, tense, terrified, upset, and

worrying." It is apparent that people do use a limited subset of words to describe the experience called "anxiety." Zuckerman's scale also uses words which were checked less frequently by persons rated as anxious (e.g. calm, peaceful, happy) and these words are scored for anxiety if they are not checked. Subsequent to the development of the anxiety scale, Zuekerman and Lubin (1965) added scales for depression and hostility and the test is now known as the Multiple Affect Adjective Check List (MAACL). There are two forms for the MAACL: a "General," or trait, form which asks the testee to check words which describe how he "generally" feels, and a "Today-now," or state, form which asks the testee to describe how he has felt on the day of the test, immediately, or any specified intermediate period of time. Both forms of the MAACL use the same adjectives.

Spielberger (1965) developed a theory of trait and state anxiety and he and his students have used the trait and state forms of the MAACL anxiety scale to test predictions from the theory. Recently, Spielberger, Gorsuch and Lushene (1969) have developed their own trait and state measures of anxiety: the State-Trait Anxiety Inventory (STAI). The items are brief statements such as "I feel upset" (state), or "I worry too much over something that doesn't matter" (trait). The testee responds on a 1 to 4 scale for each item. Although there are some items in common, the trait and state forms are different.

Cattell and Scheier (1961) define trait anxiety as a second-order factor emerging from factor analyses of their 16 primary factors. From this research they have developed the IPAT Anxiety Scale Questionnaire. State measures have been developed from P-technique (factoring scores on measures across occasions) and differential R-technique

(factoring difference scores between 2 occasions). These researchers have resulted in the IPAT-8 Parallel Form Anxiety Battery (Scheier and Cattell, 1962). This test includes a number of subtests which measure trait anxiety and certain physiological measures may also be used with the questionnaire forms. Many of the questionnaire items refer to the occurence or frequency of past experiences and Spielberger (1972) has questioned whether this is a state test as it purports to be. This brings us to the next issue: How does one distinguish between trait and state tests other than by the instructions or the wording of items? The question is a crucial one in evaluating the current trait and state tests and investigating whether projective techniques, with their ambiguous sets, are really trait or state measures.

Zuckerman (1971) has suggested a number of criteria by which trait and state tests can be distinguished:

1. While both trait and state tests should have high internal consistency, or item reliability, trait tests should also show high retest reliability while state tests should have low retest reliability. It is assumed that states fluctuate over time not because of error of measurement but as a function of external events affecting the individual.

2. Trait and individual state tests should correlate to a low degree, but if trait tests are valid they should correlate moderately with the mean of a number of state tests.

3. Trait tests should correlate with a relevant trait measure in another test to a higher degree than with state tests; state tests should correlate more highly with other concurrent measures of state,

such as autonomic arousal or performance decrement, than with trait measures.

4. Trait tests should not change with transient changes in conditions, while state tests should be sensitive to immediate conditions which affect the relevant affect or motive.

These criteria can be used to examine the findings on trait and state measures of anxiety, particularly studies that have measured both traits and states.

Reliability Patterns

Zuckerman and Lubin (1965) have reported high split-half and retest reliabilities for the General (trait) MAACL anxiety scale. The corrected split-half reliabilities for the Today (state) MAACL are about .8 in studies by Datel et al. (1966) and Zuckerman et al. (1964), but the retest reliabilities in these studies and a study by Hayes (1966) are typically .2 and .3.

Spielberger et al. (1969) have also found high internal consistency coefficients for both their trait and state STAI anxiety scales. They found high retest reliabilities for the trait scale (.7 to .9) and a median retest reliability of .3 for the state scale. Spielberger et al. have found higher internal reliability coefficients when the STAI is given under conditions of psychological stress. The Hayes study found higher retest reliabilities for the MAACL anxiety state scale when given before or after examinations than when given on ordinary class lecture days. But Zuckerman (1971) has reported no greater correlations among 11 exam day MAACLs than among 11 weekday, or 11 weekend MAACLs in a group of student nurses tested daily for 77 days.

In contrast to the MAACL and STAI state scales the Lorr (1971) Profile of Mood States (POMS) shows high retest reliability. In the POMS the subject is asked to rate his mood over the previous week. Datel (1966) used a weekly form of the MAACL and found .3 to .4 retest reliabilities as he did for the daily forms. However Lorr's data are based on psychiatric patients. Zuckerman and Lubin (1965) have reported high retest reliability (one week interval) for the state form of the MAACL in psychiatric patients. Johnson (1966) has also found high retest reliabilities for the MAACL anxiety state scale given under different conditions to a group of psychiatric patients. The trait reliability was even higher (.93) in this group. It may be that psychiatric patients are characterized by reliably high states of anxiety.

Nowlis (1965) has reported relatively high retest reliabilities for state measures, based on his Mood Adjective Check List (MACL). He also noted that the day-to-day correlations tended to increase with repeated use of the test. "Thus there may be a tendency toward stereotypy of response as a person uses the MACL daily over a long period" (p. 368). If this is true, the high retest reliability would indicate that their scales will be insensitive in longitudinal studies of affect over more than a few occasions.

The intercorrelations between Scheier and Cattell's 8-parallel form anxiety tests ranged from .36 to .67 with the typical correlations around .5. These correlations are higher than one would expect between state tests unless all of the tests were given on one occasion.

Correlations between Traits and States

Zuckerman and Lubin (1965) have reported moderate correlations between the Taylor (1953) Manifest Anxiety Scale (TMAS), a widely used trait anxiety test, and the MAACL General anxiety scale (most r's .5 to .6). The correlations between the TMAS and any single MAACL state anxiety measure are generally low, except in psychiatric patients; the correlations between the TMAS and the means of state anxiety scores are higher and close to the correlations with the MAACL trait anxiety scale. Zuckerman (1971) found that the MAACL trait anxiety scale correlated as highly (r=.63) with the mean of 77 daily state scores as it did with the TMAS (r=.60). In contrast, the correlation of the MAACL trait anxiety with individual state scales was typically .3 to .5. The higher coefficient was with the state tests given on examination days. It seems that a mean of a sufficient number of state tests is equivalent to a trait measure.

Johnson (1966) gave both trait and state tests of anxiety to psychiatric patients under different conditions and found that the TMAS and MAACL trait anxiety measures were maximally correlated on all occasions and more highly correlated with each other than with the MAACL state measure on any one of the occasions. This is an impressive finding since the MAACL trait and state forms use the same items and checklist format, in contrast to the questionnaire format of the TMAS trait scale.

Spielberger et al. (1969) found very high correlations between the STAI trait anxiety measure and Cattell's IPAT and the TMAS trait anxiety measures and a moderate correlation with the MAACL trait anxiety scale. They also found moderate to high correlations between

their trait and state STAI forms given on the same occasion (r's between .4 and .7) suggesting that trait and state may be somewhat confounded in the two forms. However, correlations between the trait and state forms given on different occasions were lower (.3 to .5). Spielberger et al. (1971) note that "larger correlations are obtained under conditions which pose some threat to self-esteem or under circumstances in which personal adequacy is evaluated" (p. 28). They also state that "changes in A-state evoked by physical danger are apparently unrelated to level of A-trait" (p. 28). Thus both Zuckerman and Spielberger have found some evidence indicating that A-trait has some predictive values for state measures during conditions of certain types of stress, such as examinations, but has poor predictive value for anxiety states on other given days.

Correlations Between Different Types of State Measures

Few studies have used more than one verbal state measure in a given situation but a number of studies have used autonomic or behavioral state measures in addition to verbal ones. In Spielberger's (1965) theory, anxiety state is defined by both subjective feelings of apprehension and activation of the autonomic nervous system. There are a number of reasons why autonomic measures would not be expected to correlate highly with subjective feelings. Hodges will probably elaborate these reasons such as lack of stimulus-response, affect-response, and individual response specificity. However, it is reasonable to expect that autonomic responses will be more highly related to concurrent verbal measures of state anxiety than to measures of trait anxiety.

Johnson (1968) and Johnson and Spielberger (1968) used the TMAS as a trait measure and the MAACL anxiety and heart rate and blood pressure as state measures. All measures were given before and after a relaxation and before and after a stress procedure. The TMAS was unresponsive to conditions, as expected, while the MAACL and autonomic measures decreased during relaxation procedures and increased during stress. Despite the parallel response of the state measures, the MAACL and autonomic state measures were not correlated on any given occasion.

Other studies have found correlations between concurrent MAACL state anxiety and heart rate (Hodges and Spielberger, 1966), spontaneous GSR fluctuations (Katkin, 1966) and a behavioral measure, decrement in digit span performance (Hodges and Spielberger, 1969; Houston, 1971; and Houston and Hodges, 1970). In all of these studies, trait anxiety (TMAS) was unrelated to physiological and performance state measures.

Sensitivity of Trait and State Anxiety Measures of Change

All of the state tests, except Sheier and Cattell's 8-parallel forms have shown a sensitivity to change in many studies. Not enough research has been done with Sheier and Cattell's test although an intensive validation study is planned (Cattell, 1971). The Zuckerman and Lubin (1965) MAACL state test has been shown to be sensitive to many kinds of experimental and naturalistic situations including: classroom examinations, arousal produced by unanncunced exams, ego threat, frustration, failure, hypnotically suggested emotions, military training and actual combat, surgery, pregnancy, childbirth, sensory deprivation, social isolation, confinement, sensory bombardment,

stress movies, threat of shock, interview stress, psychotherapy, behavior therapy, drugs, alcohol, sensitivity training and relaxation training (Zuckerman and Lubin, 1970 Bibliography).

Although Spielberger et al.'s (1969) STAI state test is new, a considerable amount of research has shown it to be sensitive to failure-threat, pain-threat, examinations, public-speaking (ego-threat), physical threat, social isolation and confinement, personality testing, pregnancy, and behavior therapy.

Nowlis' (1965) MACL has shown responsiveness to drugs, sleep deprivation, fear inducing communications, failure stress, films of various kinds, tedium stress, competition, sensory deprivation and avoidance conditioning.

The Clyde (1963) and Lorr (1971) scales have been used primarily to measure the effects of drugs and other psychiatric treatments and have shown a sensitivity to these conditions as well as a relationship to psychiatric diagnoses.

The experiments such as those by Johnson (1968) and Johnson and Spielberger (1968), which have used trait measures along with state measure to assess changes induced by controlled conditions have found that the trait measures are insensitive to change. This is not surprising since the instructions and items in most trait measures refer to generalities about the self and past reactions rather than the current ones. The subject's self concept is not likely to be affected by a brief procedure, no matter how arousing or relaxing. Longer term procedures such as psychotherapy have been shown to effect changes in trait tests but the changes cannot be monitored in between the pre- and post-treatment measures. Several studies,

such as Johnson and Spielberger (1968) have shown a normal decline in scores on the TMAS with repeated testings. On the other hand, state tests such as the MAACL show no trend toward increase or decline over periods as long as 77 days despite marked fluctuations on particular days (Zuckerman, 1971). It is time for those studying long-term treatments to consider the advantages of frequent monitoring of subjective states during such treatments.

Views of the Trait-State Problem

The views of the trait-state question range from Cattell (1971) who views states as "trait change factors" to Thorne (1971) who regards states as the principal data of psychology and traits as "limiting cases where etiology remains so constant that recurring states assume the constancy of 'traits.'" Spielberger's position is intermediate. The trait represents individual differences in the frequency with which states have been manifested in the past, and the probability that such states will be experienced in the future. Spielberger believes that the trait may be measured by a questionnaire and will predict the state responses to situations perceived as relevant. However, he has also noted some limitations on prediction from traits in that prediction of the state is better when the person is in stress situations, i.e., ego or failure threat, as opposed to impersonal threat of pain. If we accept Spielberger's definition of a trait, then a trait is valid only to the extent that it can predict states in some specified range of situations. Perhaps we need the dimension of situation built into our trait test items in a more systematic way. Trait measures should be developed that sample both situations and responses, as in Endler et al.'s (1962, 1968) S-R Inventories for Anxiety and Hostility.

Zuckerman, Persky, and Link (1967) have suggested that the trait might be defined by the mean and variance of an individual's measured states. In a recent paper, Zuckerman (1971) showed that trait measures correlate minimally with specific states, and only slightly better with the mean of such states. The mean of states was the best predictor of states with an average correlation of .7 with the individual states of anxiety. What this means is that an individual's states vary around a level which is characteristic for him. The mean of states can itself be more effectively predicted by an initial sampling of states (as few as 3) than by a conventional trait measure. For instance, the mean of MAACL anxiety state measures correlated .5 with 10 subsequent weekday states, and .6 with 10 subsequent weekend or exam-day states. This is in contrast to .1 to .3 predictions from the TMAS and .3 to .5 predictions from the General MAACL trait measures.

Zuckerman (1971) has extended the studies of trait predictions of states from affects to motives such as those measured by the Gough-Heilbrun Adjective Check List. The conclusions from both types of tests are similar:

"The general trait measure does not predict the state of a person on a given day of his life and gives only a weak prediction for the average level of his states over time. The most accurate way of representing a trait is from the mean of states. The best way to predict states is from a sampling and averaging of prior states" and, it should be added, in similar situations to the predicted ones.

What future is left for trait tests? The trait test may be useful only at the extremes. From the magnitude of correlations between traits and states it is apparent that only individuals at the extremes of the

trait distribution can be expected to have a particular response to a particular kind of situation. Such tests may be useful for theory construction (selecting individuals for experiments from large initial pools) but they cannot be expected to be precise in individual prediction over the range of scores. It is therefore suggested that future work be devoted to developing new state measures and using them to study personality in a longitudinal fashion. After valid state measures have been developed P-technique could be useful in ordering and grouping such measures. The development of valid state measures, whether verbal reports, physiological or behavioral, and the use of such measures to define traits will promote the coalescence of Cronbach's (1957) two psychologies.

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V. Physiological Aspects of Anxiety

William F. Hodges
University of Colorado

When under stress, subjects report increases in heart rate, sweating, breathing, and other autonomic physiological responses, and report feeling more anxious. However, the relationship between how a person feels and how he responds physiologically is very complex, even though common experience indicates a close relationship. In fact one of the most puzzling aspects of research in anxiety is the failure for these two different kinds of dependent measures to correlate significantly when a subject is under some kind of stress. Strict behaviorists disallow the verbal report measures as having any special meaning as a reflection of internal states, and tend to prefer physiological measures as more acceptable response measures. Cognitivists tend to accept the phenomenological variables as more relevant to the study of internal emotional states, and dismiss the physiological measures as too complex or less sensitive. Yet from the early theories of James and Lang to the more recent thinking of Schachter (1964) and Lazarus (1966), there has been an emphasis on the importance of developing an understanding of both physiological and experiental indices of anxiety. Freud (1936) defined anxiety as having both physiological and phenomenological aspects; while not based entirely on his theories, most research has been based on an assumption of a relationship between these two different kinds of measures.

One reason why such research has been equivocal is due to the ambiguity of the term anxiety. Cattell and Scheier (1966) noted that the term "anxiety" has been used to refer both to a transitory state

of the organism and to a relatively stable personality trait. Although Cattell and Scheier have identified variables which load differentially on state and trait anxiety factors, they have not specified the relationship between the two anxiety constructs. Spielberger (1966) has recently proposed a conceptualization of anxiety that specifies the relationship between the concepts of trait and state anxiety. Spielberger defines state anxiety as consisting of subjective feelings of apprehension and tension along with heightened autonomic nervous system activity, and trait anxiety as anxiety-proneness, or individual predisposition to respond with heightened levels of state anxiety under stressful circumstances. Consistent with this view, Cattell and Scheier found that physiological indices consistently loaded on the state anxiety factor, including such measures as systolic blood pressure, heart rate and respiration rate (1961, p. 193). Physiological measures did not load on the trait anxiety factor. Many studies have tried to relate a trait anxiety measure, the Taylor (1953) Manifest Anxiety Scale, with autonomic nervous system measures, and have tended to find negative results as might be expected. For example, Calvin, McGuigan, Tyrrell, and Soyars (1956) report a correlation of -.01 between the palmar perspiration index and the Taylor (1953) Manifest Anxiety Scale under digit span stress. Mandler and Kremen (1958) noted that the Manifest Anxiety Scale correlated with two measures of total physiological activity, -.02 and -.05, while under an intellectual stress situation. Hodges and Spielberger (1966) report a correlation of -.05 between the Manifest Anxiety Scale and change in heart rate under threat of shock.

The assumption that subjects who differ in trait anxiety will necessarily differ in state anxiety when placed under any kind of threat is not supported by research. Recent evidence suggests that state anxiety responses may be related to level of trait anxiety only under specific stimulus situations. Spielberger (1966) has proposed that trait anxiety scores reflect a predisposition to respond with heightened state anxiety to situations involving the possibility of failure or loss of self-esteem and not to situations involving harm or threat of harm, fears which may be related to other personality traits. A variety of studies support this theoretical statement (Auerback, 1969; Hodges, 1968; Hodges and Felling, 1970; Hodges and Spielberger, 1966; McAdoo, 1969; Spielberger, 1962; Spielberger and Smith, 1966).

Even when state anxiety has been evaluated (instead of trait anxiety) and compared with physiological responses, the results have been disappointing. For example Weinstein, Averill, Opton, and Lazarus (1968), in a re-analysis of six studies, report a range of correlations between self-reported distress (state anxiety) and skin conductance or heart rate (whichever was larger) from -.15 to .31, with a mean correlation of .03. McReynolds, Acker, and Brackbill (1966) also report low, nonsignificant correlations for subjective anxiety and basal conductance and palmar sweat. However, occasional positive findings have also been obtained (usually where high state anxiety has to be inferred). For example, Haywood and Spielberger (1966) report differences between high and low trait anxiety subjects in palmar sweat under conditions that might be assumed to be stressful. Rappaport and Katkin (in press) found that high trait anxiety

subjects responded with significantly greater nonspecific GSR's than low trait anxiety subjects under stress. Hodges and Spielberger (1966) obtained a correlation of .49 between a measure of state anxiety and change in heart rate under threat of shock. Neither measure was related to trait anxiety however. Such confusing results have led investigators to search for the circumstances under which phenomenological and physiological variables are related.

Arousal. The primary interest in physiological variables relating to anxiety states has been in autonomic nervous system (ANS) activation. To a much lesser extent neuro-endocrine and central nervous system arousal have been investigated but these systems are more complicated and the role of emotion in their activation is only dimly understood. It is clear that a concept of general over-all arousal of the ANS is grossly over-simplified. Correlations among ANS measures such as heart rate, galvanic skin response, respiration rate, blood pressure, and blood flow tend to be very low so that no one measure could be used as an indicant of "arousal." One determinant of this low correlation is response stereotypes. It is well documented that individuals have specific response patterns in autonomic functions, that some are heart rate responders and others respiratory responders or perhaps responders both with GSR and heart rate. These response patterns are reliable over time and occur regardless of the type of stress to which the subject is subjected (Lacey, 1959; Lacey and Lacey, 1958). Few studies of the relationship between physiological and phenomenological measures have taken response stereotypes into account.

Possible solutions to this problem include: (1) the use of a standardized score of the most responsive physiological modality for

each subject; (2) a summation of all standardized scores for each subject; (3) preselection of subjects, responsive in one or more physiological modalities; or (4) expression of response to stress as a percentage of the amount of physiological response for that person to a set of standard stressors, an approach similar to the ipsative approach suggested by Opton and Lazarus (1967).

Stimulus-response specificity. In addition to individual differences in response patterns, different stimuli produce specific response patterns. Lacey (1959) has documented what he calls a "directional fractionation of response." He has proposed that situations requiring attention to external stimuli result in cardiac deceleration and situations leading to rejection of external stimuli result in cardiac acceleration. While the precise definition of the stimulus characteristics leading to such responses is still in doubt, some research does conform to these predictions (Lacey, Kagan, Lacey and Moss, 1963). Thus the characteristics of the stress may affect the physiological pattern obtained.

As Krause (1961) pointed out, no physiological measure can be used as an independent criterion measure of state anxiety because other emotional states also lead to increased physiological functioning. However, different emotional states lead to different physiological patterns. Ax (1953), for example, has clearly demonstrated that fear and anger have different physiological patterns. In our laboratory we often find that state anger and state anxiety tend to be highly correlated. Evaluation of other emotional states may be required to determine the relationship between self-report state anxiety and physiological responses.

Defense mechanisms. One problem with verbal report as an index of state anxiety level is the validity of such measures. Social desirability and defensive processes may influence how a person responds to a questionnaire. A highly anxious repressor may behave physiologically differently from a low anxious subject, even though on self-report state anxiety measures they obtain identical scores. Weinstein, Averill, Opton and Lazarus (1968) report that repressors responded to stress with greater autonomic arousal than sensitizers. This finding has been difficult to replicate however. Epstein (1967) has demonstrated that defensive processes affect both verbal report and physiological responses for the stress involved in sky diving. Houston and Hodges (1970) found that discrepancies between verbal report and a physiological response predicted performance. Although the study did not use physiological measures, Boor and Schill (1967) found performance differences for high and low trait anxiety subjects only when defensiveness in low trait anxiety subjects (as measured by a social desirability scale) was taken into account. Defensive processes may differ as a function of the type of stress. High and low trait anxiety subjects responded with different levels of defensiveness only to stimuli in a projective test that involved threat to self-esteem and not to stimuli involving physical danger (Kelly, 1970). The measurement of coping processes has potential usefulness for clarifying the relationship between physiological and phenomenological measures of state anxiety.

Autonomic awareness. Subjects differ in the degree to which they accurately perceive their own autonomic activity. The Autonomic Perception Questionnaire, a measure of bodily reactions developed by

Mandler and others, has been found to correlate with the Manifest Anxiety Scale .27 ($p<.05$). Subjects high on the questionnaire tended to overestimate their physiological activity while low perceivers underestimated their physiological activity (Mandler and Kremen, 1958; Mandler, Mandler, and Uviller, 1958). Schachter (1964) has noted that the interpretation of physiological activity may lead to specific emotional states. For example, Simpson (1969) found that false feedback of heart rate led to changes in the report of anxiety states. Thus, how a person interprets his physiological functioning may determine the relationship between physiological and phenomenology variables.

Conclusion. Recent summaries of research on physiology and stress (Appley and Trumbull, 1967; Black, 1970; Lazarus, 1966) all leave open the question of the conditions under which physiology and phenomenology are related. One reason for the complexity of such research is the need to take these variables into account simultaneously. Since the parameters of each variable are not clearly defined, such studies have yet to be done.

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VI. Anxiety and Learning

L. R. Goulet
University of Illinois at Urbana-Champaign

I. Some History

As in most areas of research, studies concerned with the relation between anxiety and learning have been strongly influenced by the prevailing theoretical positions at the time they were conducted. However, there are two notable "twists" in this problem area: First, the impetus which guided many of the early studies of the 1950's has been carried along unchanged by the overwhelming influence of Hull-Spence theory (a theoretical position hardly concerned in a major way with personality in general or with anxiety qua anxiety in specific). In fact, most of the early research predicated on Spence's theory was not concerned specifically with anxiety, but rather with the influence of generalized motivation states (drive) on human performance (e.g., Spence, 1958; Taylor, 1956).

Second, there was a regrettable mismatch between the original purposes of the research (theory-testing within the Hull-Spence model) and the needs of the scientific community for well-defined personality constructs or dimensions which were correlated with overt performance.

The widespread interest in the study of personality and the lack of viable, testable theories were likely responsible for a major portion of the overwhelming interest in the work surrounding Taylor's (1953) Manifest Anxiety Scale (MAS). However, as with any mismatch, the journals were soon filled with controversy concerning the construct validity of the MAS (Cronbach & Meehl, 1955; Kausler & Trapp, 1959; Spence, 1958; Taylor, 1956) and alternate propositions concerning the behavioral covariates of the MAS (e.g., Saltz & Hoehn, 1957;

Trapp & Kausler, 1960). It is therefore understandable that the research literature was filled with statistically significant, yet equivocal results [see Bolles (1967) for a review].

The early 1960's reflected a period when a sizable portion of the research on anxiety and learning was directed to examining the ranges of influence of anxiety on performance, identifying the environmental conditions under which anxiety was correlated with learning performance, and specifying the variety of personality variables which interacted with anxiety in determining levels of performance in learning tasks. Notable examples here were Atkinson's (1964) theory of achievement motivation, Malmo's (1958) attempt to identify the physiological correlates of anxiety within his Activation level theory, and Eysenck's (e.g., McLaughlin & Eysenck, 1967) theorizing concerning the interaction of anxiety, extraversion, and neuroticism.

Perhaps the most notable extension of the early work was the incorporation of the suggestions made by Mandler and E. B. Sarason (1952) into most theoretical models available at the time. This includes the Taylor-Spence model (J. T. Spence & K. W. Spence, 1966) on which the early research largely ignored Mandler's and Sarason's propositions. In short, Mandler and Sarason had suggested that anxiety serves as a drive stimulus rather than a generalized motivational state. These drive stimulus properties were assumed to be activated in the context of stressful or evaluative situations. Thus, the distinction between anxiety as a <u>chronic</u> personality trait was contrasted to its viable alternative as a general susceptibility to react to situational stress factors. At various times the MAS has been deemed an index either of chronic or situational anxiety [see

Goulet (1968) and Spielberger (1966) for reviews] whereas the Test Anxiety Questionnaire developed by Mandler and Sarason (1952) has been identified as a measure of situational anxiety (e.g., Pagano, 1970; Pagano & Katahn, 1967; Sarason, 1956, 1957).

II. Recent Theorizing and Needed Research Directions

It is important to note three trends in current research related to anxiety and learning:

1. Current theory and research is predicated on models of personality theory rather than on models of learning theory, and quite properly, learning tasks are seen as convenient modes through which to determine the influences of anxiety (Goulet, 1968).

2. Anxiety is now seen as multidimensional as opposed to unidimensional in its origins and influences (e.g., Saltz, 1970; Spielberger, 1966). Early theories and research suggested that the influences of high anxiety could be debilitating or could enhance performance depending on the task on which the individual was performing (e.g., Spence, 1964), the current level of physiological arousal (e.g., Malmo, 1958), or whether performance was being assessed under evaluative, threatening, or stressful situations (e.g., Mandler & Sarason, 1952; Sarason, 1956). Out of such work followed the notion that anxiety could be conceived both with enduring and short-term characteristics, providing the basis for devising instruments which reflect both dispositions (Cattell & Scheier, 1961; Spielberger, 1966).

3. Perhaps the most important contemporary trend in recent research relates to the analysis of the different types of situational and/or environmental variables which differentially influence

the learning performance of low and high anxious individuals (Saltz, 1970; Spielberger, 1966).

For example, Saltz (1970) has suggested that the performance of high anxious individuals is disrupted under conditions of failure-induced stress, but not under pain-induced stress. Conversely, he suggested that individuals identified as low anxious are susceptible to disruption in performance under pain-induced stress, but not necessarily under failure-induced stress. This means that instruments used to measure anxiety may rather provide an index to the type of situations considered to be stressful by different individuals.

In a similar vein, Spielberger (1966, 1971) has differentiated between state and trait anxiety and has distinguished these from the stimulus conditions which evoke anxiety-state reactions. State anxiety, according to Spielberger, refers to the complex emotional reactions to situations perceived as threatening. The reactions are characterized by feelings of tension and heightened autonomic nervous system activity, but are transitory in nature, vary in intensity, and can fluctuate over time. Trait anxiety, on the other hand, is assumed to reflect a relatively stable and permanent personality characteristic, and likely a susceptibility to "anxiety proneness" (Spielberger, 1966).

Both Saltz and Spielberger emphasize the fact that the assessment of the influences of anxiety on performance must take into account the environmental conditions under which the person is performing. Further, both note the extremely limited range of situations under which such research has been conducted, and that <u>perceived</u>

stress is likely the important variable which interacts with anxiety in determining performance. In other words, it is not enough to make the assumption that particular stimulus conditions (e.g., threat of shock) affect all individuals in the same way.

III. Some Methodological Considerations

I have already identified some of the laudable new directions in the assessment and identification of the multidimensional properties of anxiety, including the determination of the stimulus conditions in which the influences of anxiety are manifested. However, it will also be useful to examine research strategies which concern the anxiety-learning relationship directly. For example, research has not been conducted which examines the (likely-changing) interrelationships between performance and anxiety at different stages of learning. Similarly, recently developed methods of factor analysis for the determination of generalized learning curves (e.g., Tucker, 1966) make it possible to assess the relationship between various components of learning and anxiety at different points of mastery on the learning task. Just as anxiety is multidimensional in nature so is the process we describe as learning (e.g., Goulet, 1968). The initial attempts to do this have been successful even though the newly available and highly-powerful multivariate statistical methods were not used (Goulet & Mazzei, 1969; Spielberger & Smith, 1966).

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VII. Anxiety in Children

Beeman N. Phillips
The University of Texas at Austin

There are a number of gaps in our knowledge about anxiety in children. The present report will identify needed research and research approaches, and make suggestions concerning specific theoretical and methodological problems related to that research.

Some needed research approaches. Several general observations and recommendations can be made concerning the status of theory and research on anxiety in children.

1. The theorizing which characterizes the field is heterogeneous (Spielberger (Ed.), in press), and there is an urgent need for integrative theory and a parsimonious set of principles which can account for the facts. In particular, a comprehensive theory of the nature of stressful situations is needed, and the work by Mandler and Watson (1966) and Phillips, Martin, & Meyers (1969) represents a promising approach to this problem.

2. There is need for a broader perspective on anxiety in children (e.g., age changes, sex differences, social class and racial-ethnic factors, personality correlates) which can only be achieved by examining anxiety in children within different cross-cultural contexts (Phillips, Martin, & Zorman, 1971).

3. There needs to be more use of the experimental method, in combination with differential or correlation strategies (Sieber, 1969), with laboratory experiments being replicated and extended to lifelike and appropriate field or natural settings (Epstein, 1967).

4. Particular attention needs to be given to developmental changes in patterns of anxiety and to variations with age in the

relationships of demographic and personality variables to anxiety behaviors. In addition, a developmental perspective is needed in the measurement of anxiety, since responses to anxiety scales may be telling us less about the affect than about the self. That is, they may be telling us about the "attitudes, cognitive processes, and experiences which are consequences, in a developmental sense, of unambiguous anxiety, and the environment's response to it" (Sarason, 1966).

Problems of definition and measurement of anxiety in children. The research literature on children's anxiety has, for the most part, not concerned itself with distinguishing between state and trait anxiety (Spielberger, 1966). While it is attractive to utilize a global concept of anxiety that embraces a broad range of behaviors, and thereby gives coherence to otherwise disparate and scattered observations, one may be placing under the same rubric behaviors which are functionally different with respect to their antecedents, correlates, and effects. Moreover, investigators need to be more sensitive to the issue of what anxiety scales really measure, and more sophisticated in attempts to distinguish between defensiveness and anxiety (Cattell and Scheier, 1961). This is essential because it would appear that there are developmental implications in such distinctions which are especially important for the understanding of anxiety in children. For example, trait anxiety and defensiveness should have a less prominent role in the anxiety manifestations of younger children. In addition, anxiety usually is inferred from the stimulus situation or from responses, with few investigators having taken direct physiological measures of anxiety in children.

Research needs to correct this bias. A related ambiguity in the literature is the lack of anxiety tests for children which distinguish between modes of anxiety response, specific anxiety responses within modes, and the different situations in which such responses occur. A promising approach to this problem has been made by Endler, Hunt and others (Endler, Hunt, & Rosenstein, 1962; Endler & Hunt, 1968, 1969), and further study and elaboration of this approach is recommended.

Etiological aspects of anxiety in children. There probably are different routes to the development of anxiety. For example, there is a need to differentiate between anxiety in children which is: (1) specific, and localized to a particular stage of development, where the influence of environment is benign, and constitutional factors are absent; and (2) diffuse, and pervading all stages of development, where environment is pathological and pathogenic, and there is constitutional vulnerability. These different origins of anxiety need to be analyzed, and related to advantaged and disadvantaged anxious children, with the latter point of view probably being more applicable to anxious children from lower class, minority status backgrounds. In addition, research is needed to correct the bias toward psychogenesis which is found in most studies of anxiety in children, since this often results in neglecting or ignoring the physical factors (either causal or associated) in anxiety. A more polygenic, or broader psychosomatic and ecological, view of the origins and development of anxiety in children is needed in future research.

Distinguishing between antecedents and consequences of anxiety. Relationships between anxiety and social behaviors (e.g., dependency, aggression), and between anxiety and intellective behaviors (e.g., intelligence, cognitive processes) are particularly important because of their causal implications. For example, is dependency an antecedent and/or a consequence of anxiety? Does the substantial negative relationship (especially for children) between anxiety and intelligence indicate that those who are intelligent are more capable of coping with their environment and are, therefore, less anxious? Such alternative explanations lead to widely divergent possibilities for the prevention and amelioration of anxiety and its debilitating effects. But we need more hard evidence to adequately distinguish between them. Figure 1 presents a paradigm which may have heuristic value in pinpointing needed research and in organizing and integrating results of such research. In this paradigm, proximal antecedents are those personal and situational factors which are directly responsible for anxiety reactions. In contrast, distal antecedents are environmental and organismic factors which contribute to the factors-in-persons previously classified as proximal antecedents. However, if state anxiety is differentiated from trait anxiety, distal antecedents also would be involved in trait anxiety (as a personal factor). In Figure 1, concomitants are phenomenological, physiological, and behavioral factors closely related to, and sometimes thought of as actual indicators of, anxiety (e.g., fear, which is sometimes used interchangeably with anxiety; other affects like distress; physiological factors like blood pressure and heart rate; and behavioral factors like tremor and speech disturbances).

Proximal consequences consist of factors which are intimately associated with and the direct result of anxiety (e.g., defensiveness, poorer short-term memory), while distal consequences are indirectly related to anxiety and the result, in a developmental sense, of the environment's reaction to anxiety (e.g., dependency).

Figure 1 about here

The prevention or reduction of anxiety and/or amelioration of its negative effects in schools. The reduction of psychological stress is probably the most effective way to reduce anxiety in schools (Phillips, Martin & Meyers, in press), although this generalization may be more applicable to state than to trait anxiety (however, the need for research on this latter point is evident). Moreover, in order to implement programs for the reduction of anxiety in children, one has to know what types of school settings are potentially stressful--and why, and for whom, they are stressful. A number of theorists (e.g., personality theorists like Freud, Rogers, and mental health theorists like Caplan) have given attention to conceptualizing which types of naturalistic situations are likely to be stressful. Although there are school situations which are generally hazardous or potentially stressful to many children (e.g., test and test-like situations), not all children find such situations stressful. What is needed, therefore, is a great deal of research on such school situations. One of the purposes of such research would be to determine the stress producing potential of specific school situations, which could be determined by an estimate of the number of children that find a given situation stressful.

Another would be to identify the role of motives engendered by potentially stressful school situations. Still another would be to analyze the coping styles of children in reaction to stressful school situations, since this influences whether anxiety reactions, rather than some other coping reactions, occur to the situation.

Another way to reduce anxiety in school is through the use of various types of therapeutic techniques, including individual and group therapy, behavior therapy (especially positive reinforcement and desensitization), sensitivity training, and therapeutic tutoring. These and other techniques of this type are discussed in detail by Phillips, Martin, & Meyers (in press). Undoubtedly, considerable research is still indicated if such methods are to be more successfully used.

There also are intervention strategies which attempt to manipulate the debilitating effects of anxiety. Especially noteworthy are programmed learning and instruction and the use of modeling and related methods. However, the empirical results for such techniques are equivocal (Phillips, Martin, & Meyers, in press).

Finally, there are a number of promising school-related intervention strategies designed particularly to prevent the development of anxiety in school. Examples of such strategies are the utilization of teacher-psychological specialists, the development of Diagnostic-Intervention classes, use of crisis intervention techniques, placement in special education classes, and the greater incorporation of psychological principles in the curriculum (especially teaching toward a causal approach to behavior). All of these strategies are analyzed and discussed by Phillips, Martin, & Meyers

(in press), although again it must be noted that there is a paucity of research on them.

In summary, two conceptions of school-related intervention emerge. One has its focus on naturalistic stress (in this case, principally in school settings). Stressful school situations need to be identified, anticipated, and modified in the school system as a whole, at the level of particular schools, within certain subgroups of children, and for individual children. The other has its focus on discovering and/or developing school-learning environments which utilize the advantages and avoid or minimize the disadvantages of anxiety. Of course, these complementary efforts can proceed successfully only if they are accompanied by systematic, sustained, and coordinated research programs, which up to now have been largely lacking.

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Distal
Antecedents
Early environmental (e.g., social class) and organismic (e.g., sex) factors and their developmental aspects (e.g., masculinity-femininity)
Proximal
Antecedents
Personal (e.g., strength of motives) and situational (e.g., degree of ambiguity) factors
Contemporary, ongoing behavioral setting in which anxiety reaction occurs
Anxiety and its concomitants (e.g., fear, tremor)
Proximal
Consequences
Immediate direct result of anxiety (e.g., defensiveness, poorer short-term memory)
Distal
Consequences
Delayed, indirect result, in a developmental sense, of environment's reaction to anxiety (e.g., dependency)

Figure 1. Antecedents, Concomitants, Consequences of Anxiety Paradigm

VIII. Neurotic Anxiety

Barclay Martin
University of North Carolina

Anxiety reactions which have a degree of intensity and persistence that would ordinarily be characterized by the adjective, neurotic, will be emphasized in this report. It is not assumed that neurotic anxiety is basically different from other, non-neurotic types of anxiety. There has been no convincing demonstration that neurotic anxiety, non-neurotic anxiety, or, for that matter, fear, differ as response systems, whether inferred from behavioral, self-report, or physiological responses. The stimuli (external or internal) which elicit the response may differ, e.g., objective dangers for fear and stimuli with no objective danger for anxiety, but does the response itself differ? This is a question that might be pursued empirically.

In terms of precision of measurement, most emotional responses, and anxiety in particular, are rather amorphous constructs. This fact contributes to many problems in research, one of which is the difficulty in distinguishing between an anxiety reaction and other emotional reactions such as shame, grief, or excitement. Although this paper is not primarily concerned with assessment, this point is stressed here because constructs such as anxiety sometimes become "frozen" by an over-dependence on one convenient operational measure, such as possibly the Manifest Anxiety Scale (Taylor, 1953). It would perhaps be wise to remain somewhat loose with respect to our conception of anxiety and view it as an emotional reaction that may be only partially differentiated from other negative affect states and one that shows considerable variation in pattern of expression from

person to person. The interplay between the emotional response and related cognitive interpretations further complicates the study of emotionality. Any measure, whether behavioral, self-report, or physiological is not a direct measure, but a channel that introduces its own kind of irrelevant "noise." The discussions of Sarason (1966) and Izard and Tompkins (1966) emphasize the richness and complexity of the anxiety response, and should serve as a caution against over-simplification in our search for a reliable measure.

Heredity

Genetic factors probably contribute to individual differences in the proneness of humans to anxiety reactions. Twin studies with normal subjects (Freedman, 1965; Scarr, 1965) and with patients with diagnosed anxiety reactions (Slater & Shields, 1969) support this proposition. Freedman's study incorporated methodological features that should be emulated in future studies. The twins were studied in the first years of life, thereby minimizing the influence of environmental variables. Movies of behavior under standard conditions were obtained for each twin separately; and experimenters, parents, and judges were kept ignorant with respect to the identical and fraternal status of the twins. Short term longitudinal studies might be conducted in which behaviorally oriented assessments permit one to study social learning influences which account for developing differences in identical or fraternal twin pairs.

Interaction of Heredity and Social Learning

Whether or not a person with a genetic predisposition toward anxiousness develops neurotic anxiety depends upon his environmental

experiences, especially those experiences that come under the heading of social learning. Thomas, Chess and Birch (1968) have made an excellent beginning in studying the interaction between traits of temperament, assumed to be largely determined by heredity, and social learning experiences. Starting at birth and continuing for six years or more they measured temperamental characteristics and some aspects of the social learning experiences of the children. The early appearance and consistency of characteristics such as "withdrawal from new experiences" and "slowness in adaptation to new experiences" suggest genetic influences, and the authors cite several individual cases which illustrate how these temperamental traits can interact with parental reactions to produce or not produce phobic or withdrawal behavior of a neurotic magnitude. Short term longitudinal studies of this sort which include the methodological improvements discussed at the end of this paper are greatly needed.

Specific Traumatic Experiences.

Behavioral and learning theory oriented investigators suggest that irrational anxiety and phobic reactions have their origins in specific anxiety arousing experiences which become conditioned, more or less fortuitously, to other stimuli which happen to be present. Studies do suggest that extreme psychic trauma such as combat experiences (Grinker & Spiegel, 1945; Kardiver, 1943), natural disasters (Leopold & Dillon, 1963), and even extreme laboratory stresses (Campbell, Sanderson, & Laverty, 1964) can produce anxiety reactions which are readily elicited when related stimuli are encountered in the future. But how common or essential are such traumatic experiences in the history of the person who develops neurotic anxiety? The

evidence is scanty and mostly retrospective. Roberts (1969), for example, found that 60% of a sample of phobic women reported a specific traumatic experience to be associated with their first phobic attack, and Langford (1937) concluded that 80% of his sample of children with anxiety reactions had had definite traumatic experiences prior to their first anxiety reactions. These studies lacked a control group of normal children which would tell us how often children have traumatic experiences and do not develop neurotic anxiety. Another approach would be to identify at the time of the trauma children who have had a severe anxiety experience and follow them longitudinally to see what proportions subsequently develop neurotic anxiety.

Parental Overportection

The clinical studies of Eisenberg (1958) and Waldfogel (1957) provide rather convincing evidence that many school phobic children and their mothers (in a few cases, father) have developed a mutually dependent relationship, where separation is painful to both. It has been proposed (e.g., Martin, 1971) that such a regime, no matter how it got started in the first place, would tend to prevent the child from learning the skills normally used in mastering new fears. The high prevalence of transitory fears in normal children (Jersild & Holmes, 1935; MacFarlane, Allen, & Honzik, 1954) suggests that no specific traumatic experiences are necessary to account for some degree of initial fearfulness. The important factor may be whether or not the child gains experience in mastering these inevitable fears. Research is needed to test more directly this theory about the relationship of the overprotective mother-child dyad to the development

of anxiety. Again, short term longitudinal studies involving some degree of direct observation would seem indicated.

Instrumental Learning

It is assumed that the anxiety response can be learned via the classical conditioning model, but to what extent can it be affected by instrumental learning? There is experimental evidence that human subjects can learn to modify certain autonomic responses such as heart rate (Engel & Hanson, 1966; Lang, Sroufe, & Hastings, 1967; Shearn, 1962) and GSR (Crider, Shapiro, & Tursky, 1966) as a function of accurate feedback. But these specific autonomic responses are not synonomous with a full-blown anxiety reaction. To what extent does a person learn to have an anxiety reaction because reinforcement contingencies provide a pay-off? This is a common clinical notion, but there is little research to justify it. My own bias is that instrumental learning plays a relatively minor role in the development and maintenance of anxiety reactions, but that's only a hunch.

Observational Learning and Mediating Cognitions

To what extent does a person learn to have an anxiety reaction because he observes another person having one? Bandura & Rosenthal (1966), and Berger (1962) provide evidence for vicarious conditioning of autonomic responses when subjects observe other "subjects" supposedly being shocked. Again, to what extent do the relatively weak results of these laboratory analogues apply to the learning of full-blown anxiety reactions? It is important to point out that observational learning of this kind assumes the prior learning of a strong empathic response. After all, not much vicarious conditioning would

occur in the above studies unless the subjects reacted empathically to the sight of the other person's distress. Aronfreed (1968) has shown that empathic responses may be learned in part on the basis of contiguity, probably following a classical conditioning model. The study of how empathic anxiety responses are (if they are) first learned in young children would thus be quite important in considering observational learning effects.

Mediating cognitions no doubt play a role in observational learning, but may also play a broader role in the learning and maintenance of anxiety reactions. To what extent do parents' and others' verbalized warnings about dangers function in this way? There is considerable evidence that people can use cognitive interpretations to reduce distress (Lazarus, 1969) or to affect the whole character of the emotional experience (Schachter & Singer, 1962; Schachter & Wheeler, 1962). But what about cognitions that create an anxiety reaction when one would not have occurred otherwise? There are, of course, ethical considerations that should be taken into account in pursuing some of these research leads.

Defenses Against Neurotic Anxiety Displacement

Psychodynamic theories of phobia development propose that the anxiety is displaced from some original source, e.g., parental retaliation, to the phobic object. There is considerable empirical evidence that instrumental responses such as aggression can be displaced when an approach-avoidance conflict is involved, but can an emotion such as anxiety be displaced in this sense? Behavioral psychologists (e.g., Wolpe & Rachman, 1960) suggest that past associations between anxiety reactions and the phobic stimulus, are sufficient to account

for the phobic reaction. But why are certain aspects of the original situation and not others selected as the phobic stimuli? Epstein's (1967) research with sport parachutists suggests that fear may, in some sense, be displaced, and in fact be stronger for the displaced stimulus than for the original target stimulus. To explain his empirical findings, Epstein proposes a theory of excitatory and inhibitory processes which should be checked out by further research.

Identification. In the course of my research work with families (e.g., Martin, 1967; Martin & Hetherington, 1971), I have been struck by the strong tendency that some children have to internalize the viewpoints of a parent who produces intense negative affect in the child by irrational attacks and criticisms. The internalized viewpoint usually involves seeing himself as bad and blameworthy, and the parent's irrational attacks as justified. What features of family interaction contribute to the development of this way of coping with anxiety?

Some methodological considerations. I would give priority to the study of how neurotic anxiety develops and is maintained in the family context. Hetherington and Martin (1971) provide a methodological and substantive review of family interaction correlates of psychopathology in children, including anxiety reactions and related neurotic disorders. Short term longitudinal studies of the kind described earlier would be valuable. Hypotheses about the kind of family systems (including genetically influenced temperament traits) likely to provide a high risk for the future development of anxiety reactions could guide the selection of appropriate families for longitudinal study. The overall strategy would be to collect data

which would permit an approach to a functional analysis. What situational influences and what response consequences are associated with the development and maintenance of the anxiety reaction? Multiple measures of anxiety should be used to avoid undue restriction of the phenomenon. The data for the functional analyses should also be derived from several sources: naturalistic observations; structured assessment procedures involving more control over the situation and more restriction on the responses permitted; and some judicious use of descriptive self-reports. Global ratings or summary scores on such variables as parental overprotection are not sufficient. Data must be coded on a response by response basis so that sequential and contingency analyses can be performed. Patterson and Cobb (1970) provide a good example of the use of naturalistically obtained family interaction data in this way. Research of the kind being proposed here would develop naturally into studies of modification and prevention.

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APPENDIX

Outline for PEM Study Adopted for Planning Purposes

(Detailed changes have been made by Task Groups at the discretion of group members.)

1000. PEM Aspects of Child Development

1100. Special Problems in Infancy and Early Childhood (birth to 5 years)
1101. Group care
  1. Effects of orphanage rearing, multiple mothering vs one-to-one mother-child (or surrogate mother) relations
  2. Related effects of environmental complexity
1102. Separation anxiety: fear of the strange
1103. Readiness
  1. General concept
  2. Special application to disadvantaged children
1104. Forced training ("pushing")
  1. In relation to "natural" intellectual limits
  2. In relation to readiness
1105. Sequential organization of learning
  1. In infancy
  2. In early childhood
1106. Parental involvement and influence on early development
  1. Effects of home environment, of implicit theories and practices of parents
  2. Manipulation of parental beliefs and practices, in enrichment programs
1107. Modes of learning and experience that affect early behavioral development
  1. Differential effects on anatomical maturation and behavioral development
  2. Correspondence between rates of anatomical and behavioral development
  3. Effects of environmental (experiential) enrichment and impoverishment, and cumulative effects with increasingly complex circumstances
  4. Hierarchical conceptions of intellectual development (Piaget)
  5. Development of learning sets and their implications for intellectual, motivational, and personality development; resistance of resultant behaviors to extinction
  6. Critical periods

1200. Child Socialization
1201. Conceptualization of the socialization process
  1. Socialization pressures
  2. Learning paradigms: e.g., dependency relations and adult control of "effects" (reinforcement), reference group formation

1202. Internalization of beliefs and values
   1. Conceptualization of attitude, belief, and value systems
   2. Identification processes
   3. Impulse control (self control)
   4. Effects of environmental resources

1203. Cognitive socialization
   1. Psycholinguistic structures, language development: effects on thought, beliefs, attitudes, interests; patterns of expression, values
   2. Uncertainty and information-seeking
   3. Development of expectancies; category accessibility; assimilation; effects on perception, cognition, action
   4. Symbolism, symbolic behavior

1300. Personality Development

1301. Developmental theories (Freud, Erikson, Piaget, Sears)

1302. Developmental sequences, stages
   1. Critical periods
   2. Fluid and crystallized patterns of intelligence (Cattell)

1303. Development of self-identity
   1. Self concept, ego theories, self theories
   2. Relations to social class, racial-ethnic factors, region, sex, family characteristics

1304. Effects of age, sex, culture, and other environmental factors

1305. Development of mechanisms of coping and adaptation

1400. Behavior Change

1401. Personality, learning

1402. Susceptibility to change of personality traits, attitudes, interests, beliefs, values

1403. Measurement of change

1404. Genetic, maturation, and learning factors in physical and psychological growth

2000. Personality

2100. Conceptual and Theoretical Approaches

2101. Criteria for a viable theory

2102. Development of unified, integrated theoretical formulations
   1. Cross-level comparisons and correlations
   2. Developmental histories of stable traits
   3. Relations among trait patterns at various developmental levels
   4. Relations of traits to perceptual responses in person perception and interpersonal interaction

2200. Cognitive Conceptions

2201. Cognitive style, complexity
2202. Balance theories
2203. Cybernetic formulations
    1. Computer simulation of personality
    2. Mathematical models

2300. Developmental Approaches (see 1300)

2400. Dynamic Approaches (see 1303, 4000)

2500. Morphologic Approaches

2600. Physiologic, Psychophysiological, and Biochemical Approaches (see 2102.1)

2700. Trait Structure, Multivariate Approach - Taxonomy of Trait-Explanatory Concepts of Stylistic and Temperament Aspects of Personality
2701. Methodological problems: definition of universes of behaviors for self-report, observation-rating, and objective test studies, cross-media matching of stable structures, design paradigms, including multi-modality designs and trait x treatment designs; construct validation of traits; effects of age, sex, sample, culture, and other environmental effects, and relations of these to resulting trait patterns; the range of roles and sets in relation to diversity of response patterns obtained (social desirability, acquiescence, and other specific sets), their similarities in terms of effects on self-description, and the relations of traits to moderator variables representing such sets
2702. Observational, rating methods: rater and "ratee" sources of effects in peer and "other" ratings, in observational trait assessment, and in interpersonal interaction; explicit concern with task, stimulus presentation, response format, socio-environmental setting, and demographic characteristics of participants; conceptual and empirical relationships among similar and related trait descriptors within observational-rating subdomain and in other subdomains (self-report)
2703. Self-report methods: item pools; format; item vs cluster factorization; measurement of and correction for response bias or distortion; development of a unified, consistent conceptual framework for concepts of personality style and temperament
2704. Objective test, misperceptive, indirect assessment, and development of fresh, new approaches to personality measurement and description

2800. Creativity
2801. Conceptualization of creativity; relations to intelligence, personality factors

2802. Characteristics of the creative person
2803. Analysis of the creative process
2804. Characteristics of the creative product
2805. Characteristics of the creative situation, short- and long-term; situational factors contributing to creative performance
2806. Measurement of creativity

3000. Emotions

3100. State Patterns: Physiological, Cognitive, Behavioral
3101. Arousal stimuli
3102. Response dimensions
3103. Uniqueness
3104. Learned-unlearned dimensions
3105. Affective learning; autonomic and physiological learning

3200. Relations to Traits, Roles

3300. Moderation of Expression by Learning
1. Culture patterns
2. Age, sex, group norms

3400. Drug Effects on Emotional Patterns

3500. Differentiation of States, Reflecting Situational, Organismic, and Stimulus Variations, from Traits, Represented as Long-Term Individual Dispositions

3600. Arousal States: Adrenergic Response, Stress

3700. Dysphoric States: Anxiety, Depression, Guilt, Shame, Remorse (see 4300)

3800. Duphoric States: Happiness, Elation, Joy, Hope, Confidence

4000. Motivation

4100. Conceptualization and Theory (human motivation)
4101. Homeostatic systems, physiological need
4102. Need-press system (Murray), subsystems (n Ach)
4103. Dynamic systems (Freud, Cattell)
4104. Cognitive and cybernetic approaches: motivation inherent in information-processing functions (Hunt), cognitive dissonance theory, incongruity, collative variables (Berlyne), balance theories, exchange theory
4105. Motivation inherent in individual performance, competence motivation (White)
4106. Trait systems and patterns (Guilford, Cattell)
4107. Values systems, moral character
4108. Conceptualization of interest, attitude, need, belief, value, ideal

4200. Process and Trait Formulations
4201. Relations and differences in conception and approach
4202. Process theories and formulations
    1. Balance theories
    2. Exchange theory
4203. Trait formulations: motives, values, character traits
    1. Methodology of measurement: Strong paradigm, Thurstone scales, Likert scales, Cattell's and Campbell's indirect approaches: self-report, objective, misperception, observation, rating, content analysis, unobtrusive measures
    2. Analytic approaches: factor analysis, multidimensional scaling, profile clustering
    3. Factored patterns of sentiments, attitudes, interests, beliefs, values
    4. Variations related to age, sex, sample, culture, and other environmental factors

4300. Frustration, Stress, and Anxiety
4301. Frustration theory and research evidence
4302. Conceptualization of stress
    1. Relation to frustration (Selye)
    2. Utility of stress concept in interpretation of behavior
    3. Relationships among physiological and psychological aspects
    4. Stress and coping, adaptation
4303. Adaptation-Level Theory (Helson) (see 5100)

4400. Conflict
4401. Conceptualization of conflict (Miller, Murphy, Cattell)
    1. Types of conflict: role, value, internal
    2. Approach and avoidance relations
4402. Conflict measurement and calculus
4403. Conflict in relation to interpretation and prediction of action

4500. Interests and Vocational Guidance
4501. Incremental value of interest measurement over ability and aptitude measures in predictions of various criteria on various populations (Thorndike, 10,000 Occupations; Clark, Minnesota study)

5000. Environmental Variables

5100. Conceptualization of Environmental Variables and Their Effects on Behavior; Human Ecology

5200. Methodologies for Encoding Environmental Factors

5300. Taxonomic Systems of Environmental Variables

5400. Normative Studies of Selected Behaviors in Relation to Defined Patterns of Environmental Setting: Sampling Problems in Relation to Populations, Behaviors, Macro- and Micro-Environmental Settings

6000. Interpersonal Behavior Processes

6100. Group Theory, Role Theory, Interpersonal Settings

6200. Interpersonal Perception, Attraction, Influence; Social Acuity, Empathy

7000. Variations in Psychological Processes

7100. Paradigms for such Research, Taking Account of Persons, Tasks, Environmental Settings, and Occasions (Cattell covariation chart, Campbell-Fiske model, longitudinal replication)

7200. Paradigmatic Studies of Selected Learning, Motivation, Perception, and Other Psychological Processes to Investigate Variations Attributable to Shifts in Subject, Task, Setting, and Occasion Dimensions

7201. Analyses to estimate magnitudes of variance components in standard dependent variables accounted for by trait, treatment, and trait by treatment sources and their specific constituents

7202. Analysis of total interaction parameter estimates into principal components or other dimensions in order to compare results by such methods with conventional R, P, Q analysis, both with single dependent variables and vectors (multiple dependent variables)